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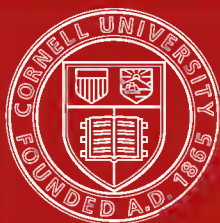
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WAR DEPARTMENT

REPORT OF THE
BOARD OF REVIEW OF
CONSTRUCTION

TO THE ASSISTANT SECRETARY OF WAR



AUGUST 31, 1919



WASHINGTON
GOVERNMENT PRINTING OFFICE
1920

WAR DEPARTMENT,
BOARD OF REVIEW OF CONSTRUCTION,
Washington, D. C., September 8, 1919.

HON. BENEDICT CROWELL,

The Assistant Secretary of War, Washington, D. C.

SIR: I hand you herewith the report of the board of review appointed by you to review the construction work rendered necessary by the war emergency and done by or under the War Department.

Respectfully submitted,

FRANCIS BLOSSOM,
Chairman Board of Review of Construction.

WAR DEPARTMENT,
BOARD OF REVIEW OF CONSTRUCTION,
Washington, D. C., August 30, 1919.

HON. BENEDICT CROWELL,

The Assistant Secretary of War, Washington, D. C.

SIR: Pursuant to the instructions contained in your letter appointing its members, this board has made a review from the standpoint of speed and economy of the construction work rendered necessary by the war emergency and done by or under the War Department. A report thereon to June 30, 1919, is presented herewith.

The board has endeavored to deal in its report with such facts as seem to be of special interest or importance and has covered particularly the methods, procedure, and results of the Construction Division of the Army under the general policies in effect.

It is recommended that consideration be given to the following

GENERAL CONCLUSIONS AND SUGGESTIONS FOR IMPROVEMENTS.

1. Retain the construction organizations, methods, and procedure that proved successful during the war and discard all others.

2. Utilize on war procurement and purchasing work the most experienced personnel securable irrespective of their business connections, grant large discretion and authority to the men who are specially qualified to grasp and handle the work and provide other competent men to check and pass upon their purchases and contracts.

3. Use for emergency conditions the standard form of cost-plus Contract for Emergency Work with such improvements as experience indicates to be desirable, and create corresponding standard forms of lump-sum and unit price construction contracts for ordinary peacetime use.

4. Employ labor on war construction according to the principles developed by the General Committee on War Labor Wage Adjustment in the fall of 1918.

5. Prepare and maintain standard and up-to-date plans and specifications for the primary construction work likely to be needed for war operations.

6. Consolidate Government inspection work under one competent bureau.

7. Encourage the development of the Officers' Reserve Corps and create a construction section of such corps in order to give some military instruction to the men whom the Government must call upon to perform its war construction work.

8. Give to students at engineering schools suitable military instruction and an opportunity for subsequent experience in a reserve corps and give to students at military schools suitable practical training and subsequent assignments to assist in a civilian capacity on commercial engineering and construction work.

9. Require that such War Department construction work as would be done in time of war by civil agencies or by a commissioned personnel drawn from civil life be done also in time of peace by the same agencies or personnel, thereby so freeing the War Department of nonmilitary construction and engineering that it can devote its energies to educating its military engineers for combat work.

The Board of Review indorses and commends the action of the War Department in placing its construction work under one bureau, entirely separated from the combatant units of the Army, conducted with the minimum of military control and according to modern business methods. The board is of the opinion that such construction so placed was done with remarkable speed, was superior in quality, was characterized by economy of design, and was as economically performed as the requirements for speed and other war conditions permitted. The facts ascertained and given in the accompanying report indicate that such construction performance contributed materially to the success of the Army operations. It is essential to the most effective work of this bureau that it be given full authority, responsibility, and control of its procurement, funds and accounting on construction, maintenance, repair and operation. The board finds that so long as the War Department is called by statutory requirement to do construction work, the best interests of the country require that it continue such bureau.

Suggestions have been received from those whose opinions are entitled to respect to the effect that Government engineering construction should be unified under competent control and adequate direction by assembling all construction activities, so far as possible, under one construction department charged with the construction and maintenance of all Government works intended for public use, this to include construction work of the Army and Navy of a civil character. The Board of Review considers that there is much merit in these suggestions and that they are in accord with the rapidly developing evidence that future wars will be fought by the entire Nation and not by a single department of the Government.

Respectfully submitted,

FRANCIS BLOSSOM,
W. SANDERS DAVIES,
CHARLES A. MORSE,
Board of Review of Construction.

PREFACE.

The Board of Review of Construction was appointed by the Assistant Secretary of War to review the war-emergency construction work of the War Department.

The review and report made in conformance with the instructions given relate to the results of inspections made of much War Department construction in the United States, but do not include any work in Alaska nor the insular possessions.

The task of reviewing the work, recording the facts, and applying the lessons of War Department emergency construction requires the study of matters of organization, design, administration, and execution within the range of recent experience, and also involves many broader subjects which are beyond the scope of such a review.

The objective of this report is to present the important facts that have been ascertained, to comment upon them from the viewpoint of experience, and to derive therefrom such conclusions and to make such suggestions for improvements as may contribute to better efficiency in Government construction work.

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REPORT OF THE BOARD OF REVIEW OF CONSTRUCTION.

INTRODUCTION.

The Board of Review of Construction endeavors in this report to state what War Department emergency construction work was done and how it was done.

The method of presentation adopted was to assemble, record, and analyze facts respecting the construction program and work completed and in progress, to comment and express conclusions thereon, and to submit suggestions for improvements.

The report is based on visits and inspections made by the members of the board which covered construction projects believed fairly to represent the work done by the War Department in the United States; on their review, study, and consideration, especially from the standpoint of speed and economy, of the facts and circumstances relating to such work, and particularly of the methods, procedure, and results of the Construction Division of the Army; on information obtained from persons in the military service of the Army, War Department employees, the War Industries Board, the War Labor Policies Board, general contractors and subcontractors, supervising engineers, advisory experts, and civilians who were qualified by personal knowledge of and experience with these matters; and on data obtained from other sources and believed to be accurate and reliable. The statements made and figures given are as of the dates stated in each instance.

The plan pursued by the board in its work was to:

1. Visit, inspect, and study a large number of typical construction projects.
2. Secure, by questionnaire and otherwise, information and facts respecting these projects as well as many of those not visited.
3. Hold numerous hearings in Washington and in the field.
4. Examine other available data, reports, records, and correspondence.
5. Acquaint itself in all other possible ways with the essential features, phases, and factors relating to the matters under review and others deemed pertinent.
6. Confer upon the information and facts obtained and reach conclusions thereon.
7. Submit the results of its work in a report giving, in appropriate detail, its findings, conclusions, and suggestions for improvements

The board has called before it and interrogated many officers and civilians familiar with and responsible for the construction work of the War Department. The names of some of those interviewed are listed in the section entitled Acknowledgments.

The board visited and made field inspections of 50 projects which had been built or were under way. During and following such visits it interviewed the constructing quartermasters and their assistants, utilities officers, auditors, supervising engineers, and contractors and secured the information which it considered important concerning these projects which include nearly all classes of engineering, architectural, and construction work; building construction from temporary wooden sheds to eight-story reinforced concrete warehouses and cold storage buildings; wood, concrete, and steel piers and wharves; streets, roads, railroads, electric distribution lines, heating plants, water supply and distribution systems, sewers and sewage disposal works; arsenals and shops; and chemical, explosives, and artillery manufacturing plants.

The accompanying report is presented in six parts.

Part I is a condensed statement which gives the essential facts and general descriptive, statistical, and other information, with comments and conclusions, concerning:

War construction in the United States.

Relations of Council of National Defense and War Industries

Board to the construction work of the War Department.

Character and scope of War Department construction.

War Department contracts for emergency construction.

Selection and work of contractors, constructing quartermasters, supervising engineers, and field auditors on War Department construction performed under the standard contract for emergency work.

The Cantonment Division and the Construction Division of the Army.

Part II relates to and gives details respecting the creation, history, organization, personnel, duties, methods, procedure, and results of the Cantonment Division.

Part III relates to and gives details respecting the creation, history, organization, personnel, duties, methods, procedure, and results of the Construction Division of the Army and its system of doing work.

Part IV relates to:

Emergency construction done by, under, or for the various bureaus of the War Department.

Selection of project sites.

Land and real estate.

Part V contains statements by the Board of Review of Construction of its principal conclusions and suggestions for improvements respecting:

Consolidation of Government construction.
Consolidation of Government procurement.
Consolidation of Government inspection.
Officers' Reserve Corps.

Summary of conclusions and suggestions for improvements.

Part VI includes the exhibits referred to in the report and an index of its contents.

The following letter by the Assistant Secretary of War to those invited to serve as members of the Board of Review of Construction states the reasons for the appointment of the board and the instructions and authority given it:

JULY 24, 1918.

MY DEAR MR. ———: It is the history of large construction programs that much can be learned from a comprehensive review of work completed in order to apply the lesson to work still in progress, by accurately recording the facts, and drawing conclusions which may be of benefit to the work yet to be performed.

For this reason it has been decided to appoint a board of eminently qualified men to review the construction work rendered necessary by the war emergency and done by or under any subdivision of the War Department. This review is to be from the standpoint of speed and economy and is to include suggestions for improvements. It is particularly to cover the methods, procedure, and results of the Construction Division of the Army under the general policies in effect. These policies have already been reported on under date of March 15, 1918, by a committee consisting of the presidents of the American Society of Civil Engineers, American Society of Mechanical Engineers, Chamber of Commerce of United States, General Contractors' Association of New York, a representative of the American Federation of Labor, and of the Building Construction Employers' Association of Chicago.

This Board of Review will be authorized to employ such engineers, constructors, accountants, clerical and other assistants as may be required and to incur such other expense of any kind as in its judgment may be necessary to review and report as above provided; however, no expense shall be incurred after May 1, 1919. The records of all such divisions of the War Department will be open to the board and it will have full authority to visit and inspect any construction project completed or underway, and to call as witnesses any persons in the military service and any employees of the War Department.

You have been recommended to serve as a member of such board. It is hoped that you are in a position to accept this appointment and thus render a most valuable service to our country. Mr. ——— and Mr. ——— have been requested to serve as the other two members of the above-mentioned Board of Review.

BENEDICT CROWELL,
The Assistant Secretary of War.

These appointments were accepted. The Board of Review of Construction so created comprised one engineer and constructor, one accountant, and one railroad engineer. Their business and professional connections were as follows:

Francis Blossom, New York:

Member of the firm of Sanderson & Porter, Engineers.
Member of the American Society of Civil Engineers.
Member of the American Society of Mechanical Engineers.
Member of the American Institute of Electrical Engineers.
Member of the American Water Works Association.

W. Sanders Davies, New York:

Member of the firm of Davies & Nield, later Davies & Davies, public accountants.

President and member of executive committee of the American Institute of Accountants.

Charles A. Morse, Chicago:

Chief engineer, Chicago, Rock Island & Pacific Railway.

Member of the American Society of Civil Engineers.

President of the American Railway Engineering Association.

Assistant director of operation, Engineering and Maintenance, United States Railroad Administration.

At the call of the Assistant Secretary of War the board members met at his office in Washington on September 11, 1918. After he had outlined the services which it was hoped could be rendered, the board organized by selecting Mr. Blossom as chairman. It later appointed Mr. Thomas H. Pierson as assistant to the board, in charge of its Washington office. His ability and experience proved most helpful in this position, which he held throughout the entire period of the work.

The board understood that it was to make a full, impartial, and constructive report, to state its criticisms, and to make any suggestions for improvements which it deemed pertinent. This it has endeavored to do. It has grouped related information and facts in sections or chapters with its comments and conclusions thereon and has given, in the last section, a transcript summary of the more important conclusions and suggestions for improvements.

In order that each section of the report should be reasonably complete in itself and that cross referencing should be minimized, some matters which are covered in detail in later sections are also referred to in the earlier and more general sections.

The Board of Review presented, on November 21, 1918, a preliminary report based on the work done by it to the date of the armistice, of which the substance has been embodied in this report.

ACKNOWLEDGMENTS.

The Board of Review called as witnesses officers from the military service, employees of the War Department and others familiar with War Department construction, all of whom responded fully and supplied desired facts and data which were supplemented by information obtained from many others. Among those examined or interviewed were the following:

Maj. Gen. W. M. Black, Chief of Engineers.

Maj. Gen. Grote Hutchinson, Chief of Embarkation Service, Newport News district.

Brig. Gen. I. W. Littell, Regular Army, former Chief of the Cantonment Division.

Brig. Gen. R. C. Marshall, Jr., Chief of Construction Division of the Army.

Brig. Gen. C. McK. Salzman, Acting Chief, Signal Corps.

Col. J. W. Joyes, Chief of Nitrates Division, Ordnance Department, accompanied by

Mr. L. T. Harkness.

- Col. W. A. Phillips, Ordnance Department, commandant Aberdeen Proving Grounds, Md.
- Col. B. W. Simpson, Inspection Division, Ordnance Department.
- Col. James B. Heckman, Supply Division, Ordnance Department.
- Col. J. H. Burns, explosives branch, Engineering Division, Ordnance Department.
- Col. D. C. Howard, Chief Sanitary Division, Medical Corps.
- Col. Winford H. Smith, Medical Corps.
- Col. Floyd Kramer, Chief of Hospital Division, Medical Corps.
- Col. W. A. Starrett, member of firm of Starrett & Van Vleck, architects, New York City; chairman of committee on emergency construction of the General Munitions Board.
- Col. Frank M. Gunby, chief of engineering division, Construction Division.
- Col. M. J. Whitson, chief of building division, Construction Division.
- Col. Peter Junkersfeld, associate chief of building division, Construction Division.
- Col. Evan Shelby, chief of contracts division, Construction Division.
- Col. J. N. Willcutt, chief of procurement division, Construction Division.
- Col. J. H. Alexander, chief of administrative division, Construction Division.
- Col. C. D. Hartman, chief of maintenance and repair division, Construction Division.
- Col. Charles Neville, chief of accounting division, Construction Division.
- Col. Millard A. Butler, constructing quartermaster, Norfolk Army Base, Va., and Camp Dodge, Iowa.
- Col. Lincoln Bush, assistant chief of engineering division, Construction Division.
- Col. George F. D. Trask, chief of section D of building division, Construction Division.
- Lieut. Col. B. B. Lathbury, liaison officer with the construction division for Ordnance Department and for Chemical Warfare Service.
- Lieut. Col. Thos. G. Gallagher, executive officer and assistant chief of supply division, Division of Military Aeronautics.
- Lieut. Col. Harold Bennington, chief of accounting section, supply division, Division of Military Aeronautics.
- Lieut. Col. Albert Forsch, explosives branch, Engineering Division, Ordnance Department.
- Lieut. Col. B. T. Converse, constructing quartermaster, Watervliet Arsenal, N. Y., Ordnance Department.
- Lieut. Col. H. S. Crocker, constructing quartermaster, Brooklyn Army base.
- Lieut. Col. W. C. Spruance, Jr., constructing quartermaster, Gillespie Shell-Loading Plant, Ordnance Department.
- Lieut. Col. E. P. King, Jr., assistant to Chief of Field Artillery.
- Lieut. Col. Geo. B. Dusenberre, Ordnance Salvage Board.
- Lieut. Col. E. B. Morden, constructing quartermaster of Camp Custer and Philadelphia quartermaster terminal.
- Lieut. Col. C. H. Smith, constructing quartermaster, Camp Mills, N. Y.
- Lieut. Col. D. H. Sawyer, constructing quartermaster, Air Nitrate Plant, Cincinnati, Ohio.
- Lieut. Col. Philander Betts, chief of report section, administrative division, Construction Division.
- Lieut. Col. D. H. Maury, advisory engineer, Construction Division.
- Lieut. Col. E. H. Abadie, supervising constructing quartermaster, Construction Division.
- Lieut. Col. J. N. Pease, assistant chief procurement division, Construction Division.
- Lieut. Col. George B. Walbridge, chief of section E of building division, Construction Division.
- Lieut. Col. F. B. Wheaton, advisory architect, Construction Division.
- Lieut. Col. O. P. Chamberlain, chief of section A of building division, Construction Division.

- Lieut. Col. George A. Johnson, assistant chief, maintenance and repair division, Construction Division.
- Lieut. Col. R. M. White, chief of section C of building division, Construction Division.
- Lieut. Col. C. C. Wright, chief of section B of building division, Construction Division.
- Lieut. Col. William Couper, material and equipment disposal unit, Construction Division.
- Mr. M. C. Tuttle, general manager Aberthaw Construction Co., Boston Mass., member of committee on emergency construction of the General Munitions Board.
- Mr. Frederick Law Olmsted, member firm of Olmsted Bros., landscape architects, Brookline, Mass., member of committee on emergency construction of the General Munitions Board.
- Mr. Leonard Metcalf, member of firm of Metcalf & Eddy, consulting engineers, Boston, Mass., member of subcommittee on engineering of committee on emergency construction of the General Munitions Board.
- Mr. Geo. W. Fuller, member of the firm of Fuller & McClintock, consulting engineers, New York City, member of subcommittee on engineering of committee on emergency construction of the General Munitions Board.
- Mr. Asa E. Phillips, consulting civil engineer, Washington, D. C., member of subcommittee on engineering of committee on emergency construction of the General Munitions Board.
- Mr. L. B. Stillwell, consulting engineer, New York City, president of American Institute of Consulting Engineers; member of the subcommittee on engineering of committee on emergency construction of the General Munitions Board.
- Mr. F. L. Cranford, director of construction, United States nitrate plants, War Department.
- Maj. S. F. Voorhees, assistant construction division, Hospital Division, Medical Corps.
- Mr. Stanley King, War Department, member of the War Labor Policies Board.
- Mr. Louis B. Wehle, lawyer, former advisor to War Department on certain labor matters.
- Mr. C. E. Denney, former chief of the transportation section, material and transportation division, Cantonment Division.
- Mr. Howard L. Rogers, chief of engineering division of Stone & Webster, Boston, Mass.
- Mr. H. B. Hardaway, president, Hardaway Construction Co., contractor for flying field, Americus, Ga., and north Camp Jackson, Columbia, S. C.
- Mr. W. A. Rogers, president Bates & Rogers, contractor for Camp Grant, Interior Storage Depot, New Cumberland, Pa., and United States Nitrate Plant No. 3, Toledo, Ohio; also dikes and cribwork at Hog Island Shipyard.
- Mr. R. B. Porter, representing Porter Bros., contractor for Camp Dodge, Iowa, and Norfolk Army Base, Va.
- Turner Construction Co., general contractor, Brooklyn Army Base, Brooklyn, N. Y.
- Mr. L. J. Horowitz and Mr. J. H. Dinwiddie, representing Thompson-Starrett Co., general contractor for Camp Upton, N. Y., and Powder Plant, Nitro, W. Va.
- Mr. W. H. Clough, of Clough-Bourne Corporation, contractor for Camp Mills, N. Y.
- Mr. Frederick Snare, representing Snare & Triest, contractor for Raritan Arsenal, N. J., and Philadelphia Quartermaster Terminal, Philadelphia, Pa.
- Mr. A. F. McArthur, representing McArthur Bros., designer, general contractor and operator of Woodbury Bag Loading Plant, Woodbury, N. J.
- Mr. James Stewart and Mr. H. W. Baum, of James Stewart Co., contractor for Pig Point Ordnance Depot, Va., and Camp Bragg, N. C.
- Mr. H. J. Deutschbein and Mr. Edward A. Hurley, representing Foundation Co., general contractor, Richmond Bag Loading Plant, Seven Pines, Va.
- Representatives of Air Nitrates Co., general contractor; Westinghouse-Church-Kerr & Co., and J. G. White Co., subcontractors, Nitrate Plant No. 2, Muscle Shoals, Ala.

PART 1.

SECTION 1.

WAR CONSTRUCTION IN THE UNITED STATES.

The construction work of the United States Government has been done by the following departments, of which the first four made most of the expenditures necessitated by its entrance into the World War on April 6, 1917:

War Department.

Navy Department.

United States Shipping Board—Emergency Fleet Corporation.

Department of Labor—United States Housing Corporation.

Treasury Department.

Department of the Interior.

Department of Agriculture.

Department of Commerce.

Few of its people at that time grasped the magnitude and vital importance of the emergency construction work that would be needed. The large foreign orders then being filled here for arms, ammunition, supplies, subsistence, and clothing included but little material for European war construction and were but supplementary to European production of war material, and their execution called for no construction comparable to that required for housing and training the new Army, which also had to be completely equipped and supplied by this country.

The Nation was unprepared for war, and especially for field combat work. It lacked trained troops, arms, munitions, aeroplanes, and supplies; suitable buildings and structures to house and train its armies; warehouses, arsenals, hospitals, specialized factories, artillery proving grounds, flying fields, and many other essential war facilities. To provide these deficiencies it called upon many of its most resourceful and self-reliant citizens, experienced in business, engineering, construction, and industrial work. It effected the mobilization, on emergency construction work, of the best brains of the Nation to an extent that could not have been accomplished except under the stress of war. The personnel which directed or performed the work included many business and professional men who, through purely patriotic motives, sacrificed important or lucrative positions. The men selected generally gave their best efforts.

Some selfishness, more or less disguised as patriotism, was in evidence, but judging by reports as to other wars, the percentage

thereof, and especially that savoring of dishonesty and fraud, seems to have been subnormal. Some of the well-meant efforts that seemed questionable at the time were doubtless merely misdirected and futile through lack of understanding or direction.

The bureaus which properly selected and utilized the available talent of the Nation and intrusted their problems to men carefully chosen for their tasks achieved a notable measure of success. A decided improvement in the conduct of war construction work, through the elimination of conflict and competition between Government bureaus, could apparently have been effected by creating a supreme coordinating board of men representing all noncombatant war functions of the Government. The duties of this board could have included the consideration of all large construction activities, both as to the results to be accomplished and as to the effect of such activities on each other. This suggestion does not reflect upon the coordinating committees of the War Industries Board or other boards, many of which did good work within the limits of their authority and jurisdiction, but the work of the individual bureaus was often so concentrated that major activities were not as fully unified as they could have been. If such a board, acting with the authority of the President, who could not personally coordinate all activities, had been created the highest degree of coordination would have been secured. As illustrating the need of such guidance, the War and the Navy Departments each acted along independent lines in the study of nitrate problems and took independent steps leading to the construction of separate nitrate plants to operate by different processes.

The success of the methods adopted demonstrated to an unexpected degree the importance of utilizing civilians on the emergency work; the advisability of eliminating military methods and rank as far as possible from war construction and making expert ability and experience the controlling qualifications for its handling; and the necessity, in order to obtain satisfactory results from civilians used on war construction, of making the methods and procedure, to which they are required to conform, those of modern business practice and not those prescribed by military usage except in the case of citizens entering the military service. The men who were chosen according to the foregoing specifications and used in the manner mentioned almost without exception developed a high degree of cooperation among themselves and between the Government and the private constructing and industrial organizations upon which it had to depend. The work done by these organizations proved that their maintenance and utilization were also vitally important to success.

Continuance of the war would doubtless have compelled the Government further to consolidate its construction organizations in order adequately to control and coordinate its construction work.

This unifying process could have been continued until a single bureau was charged with the administration of or control over all war construction in the United States. This bureau would have been responsible for meeting the construction requirements of all other bureaus and its control over construction would have paralleled that of the War Industries Board over the material resources of the country. It could have worked with such board and with the national labor boards charged with creating a proper labor policy for all war and industrial needs; utilized more efficiently the construction organizations of the country; stopped competition among the major departments of the Government if it had been backed by full federal authority; and left little opportunity for contractors to deal independently with departments and play them against each other in an effort to get the largest fees or to take the easiest or most profitable work instead of that for which they were best fitted. Such full consolidation of construction authority would also have provided effective means for conscripting and efficiently utilizing all the construction materials, ability, and labor of the Nation.

When war demands arose for emergency construction most of the available men in existing Government organizations were found too steeped in obsolete methods, with too much to unlearn, to be able to cope with the new conditions. It was found necessary to organize broadly, on modern coordinated lines, the best construction talent in the country, familiar with large undertakings and having no hampering bureaucratic traditions to unlearn, and to place in its hands all the construction work of the War Department. This effected unity of purpose and action, brought competent men to the front, caused their leadership to be accepted cheerfully and accelerated rational development in organization and methods. Many of these war demands could be met only by constructing engineers who apparently constituted a much greater factor in the conduct of this than of any previous war. It also demonstrated that the requisite qualifications of such men were not those gained by military training but were a knowledge of the essentials of engineering, fundamentals of business practice, costs, relative values and the economics of engineering work.

Time being of the essence of war construction work, the projects being numerous and widely scattered, the Government being without an efficient field construction organization competent to execute them and needing all its energies and personnel for administrative work, and it being impossible to furnish plans and specifications to bidders or to secure reasonable, if any, bids on such work, the only course open to the Government was to arrange for its construction contracts on the basis of its paying the cost plus a fee for the services of the contractor and his organization.

Material and commodity prices reached high levels during the war. The urgent need of stimulating production precluded effective governmental price regulation of most articles and allowed opportunity for profiteering. By its subsequent taxation the Government reclaimed a considerable proportion of the excess profits paid by it and by individuals and private concerns.

Labor costs and wage scales increased greatly. Wages followed closely the demands of local union labor, with a basic eight-hour day rate and an allowance of time and a half, or in some cases, double time for overtime.

The following Executive order was issued by the President two weeks prior to the declaration of war by the United States.

Under authority contained in the naval appropriation act approved March 4, 1917 (Public, No. 391, 64th Cong.) whereby it is provided:

That in case of national emergency the President is authorized to suspend provisions of law prohibiting more than eight hours labor in any one day of persons engaged upon work covered by contracts with the United States: *Provided further*, That the wages of persons employed upon such contracts shall be computed on a basic day rate of eight hours' work with overtime rates to be paid for at not less than time and one-half for all hours work in excess of eight hours:

it is hereby ordered that the provisions of the act approved June 19, 1912, limiting the hours of daily service of mechanics and laborers on work under contracts to which the United States is a party are suspended with respect to all contracts for ordnance and ordnance stores, and other military supplies and material, and contracts for fortification work, during the pending emergency and until further orders. This order shall take effect from and after this date.

THE WHITE HOUSE, 24th March, 1917.

Some of the increases in wages were necessary in order to meet increased costs of living and other increases occurred because the Government did not at first so control priorities in the allocation of labor as to prevent the useless bidding up of wages in local labor markets by its own competing construction agencies. This was a most serious condition because, during the war period, it was generally essential that construction be done without delay and at maximum speed, and failure to get labor throughout the period of the work because of its high price would not have excused those in charge for delay in meeting the Army requirements.

Labor problems were subsequently dealt with by the War Industries Board, but only to the extent that, in its approval or disapproval of a project, it considered the degree of labor congestion in the district where the work was to be located. It had no control over wages, hours, or conditions of labor. These matters were to have been handled by the War Labor Policies Board of the Department of Labor but, up to the armistice, neither the stabilizing of labor conditions nor the unification of labor control, though recognized to be essential, had been effected to a degree approaching the results accomplished with materials and commodities. This is evidenced

by the multiplicity of Government boards and commissions attempting to deal with labor. In November, 1918, a handbook of information on Government boards and departmental sections dealing with labor, issued by the Information Service of the Industrial Service Section of Army Ordnance, gave a brief but comprehensive statement of the branches and phases of labor problems and listed 15 principal boards and commissions engaged thereon. A copy of such handbook is annexed to this report as Exhibit No. 8.

Different wage rates were paid in many communities when war construction started. Trouble and loss to the Government followed its efforts to conform to the so-called Baker-Gompers agreement (made by the Secretary of War for cantonment construction on June 19, 1917; indorsed by the Secretary of the Navy on Aug. 19, 1917; and made applicable by the Secretary of War to all War Department construction on Dec. 28, 1918), to pay local union labor rates, because these were played against one another in order to raise the low figures to the high ones. Much confusion, delay, and expense would have been saved by the adoption of national or zone working and basic wage standards, or of a uniform scale coupled with a definite agreement as to what should constitute locality rates and the basis for allowable subsequent changes.

The importance of the efficient utilization of the labor resources of the country on essential war construction and other war work became increasingly evident. A plan was finally developed to found a general committee on war labor wage adjustment, though it was not in use at the time of the armistice. It was based on principles developed by wide experience, which are here quoted because of their importance:

1. All wage adjusting agencies regulating working conditions on Government work should be governed by the same standards for the same trades in the same localities as to the length of work day, pay for overtime, Saturday half-holiday and general holidays.

2. All wage adjusting agencies should attempt to standardize wages and other labor conditions either nationally or in zones, and should keep informed regarding zones fixed by other boards and conform to them so far as is practicable. There should be no variation from the scales fixed by the various agencies for employees on Government work except as may be determined upon by the agencies concerned.

3. When conditions creating a necessity therefor shall arise, wage differentials in favor of the employees of any industry may be established. The necessity for and extent of such differentials shall be ascertained by the committee of representatives created by section 5.

4. A clear statement as to the national labor policy in reference to readjustment of wages to conform to changes in the cost of living should be made by the President.

5. A committee of representatives of the governmental wage adjusting agencies should be established to meet at regular intervals for the purpose of exchanging information and promoting uniformity and stability in reference to matters under their jurisdiction. There shall be not more than two representatives from any governmental agency, and until the committee determines its own rules of procedure each agency shall have 1 vote.

6. Effective measures should be taken by the War Industries Board and other governmental agencies to prevent subcontractors and firms engaged in nonwar work from disturbing the standards established on Government work by the labor adjusting agencies.

7. Provisions in existing agreements not in harmony with the declared national policy should be modified as soon as practicable to conform to such a policy.

The question of labor efficiency on war construction has received much attention. Testimony is general that during the war there was an almost universal decrease in the efficiency with the increase in the hourly wage scale of skilled and unskilled labor on public and private construction and production work. Estimates as to the effect of such decrease in efficiency made by contractors on war emergency construction work vary between the statement that it required three men to produce the prewar output of two, and the statement that it required two men to produce the prewar output of one. These data indicate, respectively, 67 per cent and 50 per cent of prewar efficiency, and with increased wage scales and overtime account for most of the excess costs of war construction which are commonly referred to as proofs of waste and extravagance.

Complaint has been made of waste and extravagance on the part of those charged with the administration and execution of war undertakings. Whatever the cause for this may be, the facts can not be overlooked that the Nation and the Government, even before the beginning of the European War, knew the existing conditions, yet they permitted inaction to continue and failed to utilize the available time and opportunities to lessen the general unpreparedness. They must, therefore, carry much of the responsibility for the consequent heavy costs and losses. Those who performed the war construction did not create the conditions necessitating the frantic haste and consequent lavish expenditure under which they had to work.

Government and civilian organizations, quickly expanded to many times their peace proportions and working under new conditions and relationships, with all considerations subordinated to speed, were called upon to perform an unprecedented amount of construction in a minimum of time. Prices soared under the stimulus of the enormous demand for materials and labor, of which but limited amounts were available. It is impossible to ascertain the cost to the Government of its own wasteful bidding up of prices by uncontrolled competition among its major departments. Such inefficiency of labor resulted that even the payment of extremely high wages generally failed to effect increases in output.

War Department construction work was conducted on nonpartisan lines and was subject to but little political influence. There is no evidence that the building of a political machine was attempted by any one. Those charged with the execution of the work were,

however, subjected to visitations, political and otherwise, which consumed entirely too much of their time and energies.

Loss of lives and money resulted from the impossibility in many cases of getting war enterprises quickly under way. The successful handling of these problems would have required much time even if a perfect plan of operation and trained production organizations had been available, but months were unnecessarily lost in furnishing needed equipment and supplies because of the lack of foresight, of planning ahead, and of coordination of activities.

The Nation's fundamental and almost fatal mistake was in waiting until it was forced into war before really starting to get ready. The total cost of all other mistakes is negligible compared to the price, measured in lives and dollars, paid for the comparative inaction prior to 1917, in preparing for possible war. The overcoming of this handicap added greatly to the cost of the war and retarded the entire war program.

The foregoing states some of the principal causes of high costs on war emergency construction. The important question for determination in each case is not the actual cost as compared to an estimated prewar cost under conditions which ceased to exist when war began and may never return, but whether, considering the vital necessity for speed, the losses and wastes were excessive, unwarranted, or unreasonable because of improper design, management, or execution, or because of incompetency, lack of effort, disloyalty, dishonesty, or subordination of Government to private interests.

The war demonstrated conclusively the requisites for success in Government administration of emergency construction work. Old bureaus, organizations, and personnel broke down under war requirements and had to be replaced by new methods and men of proven ability. Unless full advantage is taken of the experience secured and the knowledge gained is crystallized and properly utilized the bureaus administering peace-time construction will also fail to perform their work effectively and economically.

The expenses of the war have necessitated taxation so heavy that the maximum securable efficiency in Government construction methods and personnel is necessary. It would be little short of a calamity if, considering the price paid for the experience recently gained, full advantage were not taken of its teachings. The United States conducts the largest business in the world. The protection of this and of the lives of its citizens depends upon the character, effectiveness, and economy of its future expenditures. A reasonable degree of preparedness requires that methods and personnel, proven adequate to meet war needs, should not be discarded without good cause, for in the next crisis the Nation may not be given an opportunity to prepare while others are holding the fighting line.

SECTION 2.

**RELATIONS OF COUNCIL OF NATIONAL DEFENSE AND WAR INDUSTRIES
BOARD TO THE CONSTRUCTION WORK OF THE WAR DEPARTMENT.**

The Council of National Defense and the Advisory Commission to the council were established by the Army appropriation act known as H. R. 17498, approved August 29, 1916.

The council did not effect a permanent organization until March 3, 1917. It endeavored to coordinate industrial resources and to direct their activities to meet Government needs. It consisted of the Secretary of War, as chairman, and the Secretaries of the Navy, the Interior, Agriculture, Commerce, and Labor.

The Advisory Commission consisted of seven men, experts, respectively, in transportation and communication; munitions and manufacturing; supplies, clothing, etc.; raw materials, minerals and metals; engineering and education; labor; and medicine and surgery, including general sanitation.

A director of the council and the Advisory Commission acted as the central directing and administrative head of both bodies.

The General Munitions Board, of which Mr. Frank A. Scott was chairman, was one of the subordinate bodies of the council. It began work on April 9, 1917. Exclusive of the chairman, the personnel on June 30, 1917, comprised 17 representatives of the War and Navy Departments and 6 civilians. Its efforts were directed toward coordinating the making of purchases by the Army and Navy, assisting in the acquisition of raw materials, establishing priority of orders between the Departments of War and of the Navy and between the military and industrial needs of the country and helping to develop sources of supply for manufactured articles. It also served as an advisor to the military department in the building of cantonments, the determination of prices, and the establishment of storage facilities.

The Committee on Emergency Construction, with Maj. William A. Starrett, later Colonel, Quartermaster Corps, as chairman, was organized on April 28, 1917, as a subcommittee of the General Munitions Board, for consideration of the problems of building and engineering structures. A part of the resolution defining its duties was as follows:

To suggest forms of day work contracts applicable to the construction of cantonments and similar enterprises where rapidity in construction is essential; to formulate plans and methods of expediting the construction of housing facilities in connection with engineering and construction work and activities essential thereto.

As no form of Government contract met this situation, in order to carry out the work mentioned, this committee, in cooperation with the legal committee, drafted a new form of Government contract, known as the Contract for Emergency Work. This was approved by the General Munitions Board and in principle by the Secretary of

War and has since been used on a large amount of Government construction. The committee recommended competent men as the heads of different departments of the bureau of the War Department which was to plan and direct the execution of the cantonment construction work and gathered information regarding reliable contractors. It was assisted by a subcommittee on preliminary plans, engineering and sanitation, and by other committees and individual experts.

The Committee on Emergency Construction performed much important work for the War Department, a description of which appears on pages 188-190 of the 1918 annual report of the Council of National Defense, from which the following summary is taken:

The committee has assisted in the organization of the Construction Division, has developed the emergency form of contract, the survey of the contracting industry, the design of the cantonments, and has furnished the center for dissemination of all information concerning the Army building program. It has crystallized and unified the Government's building methods in so far as the Army is concerned, and has brought practically all of its various building activities under one head. It has contributed largely to the setting up of the Construction Division as a separate and modern institution capable of handling the whole Government building program by proper business methods. It has taken part in the organization of many of the War Industries Board's sections, such as hollow tile, plumbing supplies, sprinklers, cement, lumber, etc., and has been the medium of cooperation between these sections and the Construction Division.

The committee neither prepares plans nor approves plans made by others; it makes no estimates; it does not pass upon units of cost, all of which things are done by the Construction Division. It advises concerning contractors, but does not make contracts. It has nothing to do with the selection of architects. It has, however, attempted to formulate a proper contract to be used with architects and engineers. It takes no part in the selection of building materials or in the selection or approval of sites, although at the time the cantonments were up for consideration the committee mobilized city planners throughout the country and prepared them to cooperate with the various department commanders charged with selecting the sites.

The War Industries Board was created as part of the council shortly after the declaration of war by the United States. It was, on May 28, 1917, by action of the President, formally separated from the council and made a separate executive agency and on July 28, 1917, with the approval of the President, superseded the General Munitions Board. With this change the duties of the council became, in general, those originally assigned to it in 1916, when it was expected to act as a connecting link in the transition from peace to war conditions.

The duties of the War Industries Board were originally defined as follows:

The board will act as a clearing house for the war industry needs of the Government, determine the most effective ways of meeting them, and the best means and methods of increasing production, including the creation or extension of industries demanded by the emergency, the sequence and relative urgency of the needs of the different Government services, and consider price factors and, in the first instance, the industrial and labor aspects of problems involved and the general questions affecting the purchase of commodities.

The War Industries Board soon assumed jurisdiction of the work of the various advisory committees of the Council of National Defense and reorganized these committees in sections, each with a responsible chief at its head. Mr. Frank A. Scott, who had been chairman of the General Munitions Board, was retained as chairman of the War Industries Board, but later resigned on account of ill health. He was succeeded by Mr. Daniel Willard, who resigned in January, 1918.

On March 4, 1918, the President appointed Mr. Bernard M. Baruch, of the Advisory Commission, chairman of the War Industries Board and revised the duties of the board and chairman.

Under the procedure last effective a request for clearance, or authorization to proceed with War Department construction, was first passed upon by the Requirements Division of the War Industries Board. It then went, through the Construction Division, to the General Staff of the Army and to the Secretary of War for final approval or rejection.

When the project was approved by the Secretary of War, a request for the nomination of a general contractor was made to the Committee on Emergency Construction, which, originally a subcommittee of the General Munitions Board of the Council of National Defense, became a subcommittee of the War Industries Board, after it superseded the General Munitions Board.

Reference is made to the annual reports of the Council of National Defense for additional pertinent details.

SECTION 3.

CHARACTER AND SCOPE OF WAR DEPARTMENT CONSTRUCTION.

Declaration of War by the United States necessitated that the War Department promptly solve many intricate questions as to its construction requirements and carry out a very large construction program. Each of a number of its bureaus created one or more construction organizations and began to do its own work. Detrimental competition for material and labor which soon developed among these bureaus caused the War Department to decide to consolidate its construction under one organization. This decision necessitated that a bureau be selected or formed which could be relied upon to perform the work properly and on time.

The services of the Engineer Corps, which had previously handled most of the engineering work of the War Department, were expected to be required for overseas military engineering and construction demanding the special training and experience of the Army engineer on trenching, fortifications, field bridging, mining, sapping, military railways, and other like combat work.

The War Department finally decided, after consulting with the General Munitions Board, later the War Industries Board of the Council of National Defense, in favor of the handling of its construction work by expanding the skeleton organization of the Construction and Repair Branch of the Quartermaster's Department of the Army into the Cantonment Division, later changed to the Construction Division of the Army. This was done and the division was given additional powers and authority to communicate directly with the Secretary of War.

The work first assigned to the Cantonment Division included the building of the cantonments and camps for the new Army and did not initially include much other work. This division never was called upon to perform construction for the Navy or for many of the other major departments of the Government. The Ordnance Department had created several construction organizations and begun to build the plant facilities required to meet its production needs and the Signal Corps, later subdivided into Signal Corps, Aircraft Production, and Military Aeronautics, had started its own construction work, which included camps and flying fields. Many projects of the Signal Corps and Ordnance Department were later transferred to the Cantonment Division or to the Construction Division for execution or completion.

The placing of responsibility for War Department construction in one body was a necessity corresponding to that which compelled a unity of overseas command. In each case the unification effected a betterment of methods and results and helped in mobilizing and utilizing all available resources. It would have been impracticable for each of the many relatively small construction organizations to command the necessary detailed knowledge of the location, character, and amount of securable material and labor.

While some of the War Department bureaus persisted for a considerable time in performing their own construction most of them finally turned it over to the Construction Division of the Army. The net result was an all-around improvement although it was stated that initially some minor delays occurred due to these transfers of responsibility.

Different War Department bureaus were organized and their personnel chosen especially for the procurement, production, storage, or transportation of arms, ammunition, clothing, food, and supplies. They were expected to be competent in their special lines but not in other lines such as construction. The conclusion was reached that a separate bureau, especially to do construction work, could build their requirements more speedily and economically than they could themselves under prevailing war conditions. Much loss of time and money was caused by the general failure to appreciate that the

prospective user of plant facilities is seldom the one best qualified to construct them and is often unable to lay down properly their general plan and characteristics. About six months elapsed before it was fully realized that if those engaged in purchasing, producing, storing, or handling Army equipment and supplies were as skilled as they should be in their own lines of work it was unlikely that they could also qualify as construction experts. Consequently the transfer of their construction work to the Construction Division was no reflection on their ability. It was rather a correction of the earlier error of letting them take on work which would of necessity entail a division of their energies and abilities. It seems certain that the necessary results could not have been effected successfully in any other way.

The construction work done by or under the War Department covered:

1. Troop housing, including 16 cantonments for the National Army and 16 camps for the National Guard and Regular Army; similar camps and flying fields for Military Aeronautics; hospitals; troop embarkation depots, etc., consisting generally of rapidly built wooden structures.

2. Port and terminal facilities, involving generally the construction of storehouses, docks, and wharves of more permanent character.

3. A variety of plant facilities for the production of Ordnance Department supplies, guns, and shells; also storage facilities, arsenals, and proving grounds.

4. Plants for making nitrates, powder, and other explosives, and for packing these explosives or loading them into shells.

5. Industrial plants and their enlargements, such as factories, mills, power stations, etc.; in which the interest of the Government varied with the degree of its ownership and with other contract provisions.

6. The maintenance and repair of the foregoing structures and of their utility services and the operation of such services.

These projects had many individual characteristics but enough features in common to admit of adopting general standards in design and methods of construction by allowing adaptations in the field to suit local conditions. This was especially true of the cantonments and camps, of which there was no opportunity to make detailed or individual plans in advance.

The declaration of war made it necessary to provide shelter and utility services for housing about 1,000,000 troops and required the construction, during the summer of 1917, of a large number of wooden cantonments and tent camps. The former were cities of about 40,000 population each and aggregated several times the housing capacity of cities such as Buffalo, Cincinnati, Detroit, Milwaukee or San Francisco. While the plans and general building designs had been partially

developed, many special structures, such as hospitals, depots, and remount stations had not then been designed or even determined upon. Nevertheless provision had to be made for them and materials ordered at once for the construction of the temporary and permanent buildings and for the water supply and sewerage.

The immediate need for extensive housing and training facilities was recognized by a number of engineers and builders who volunteered their services to help in these problems of determining the character of the required structures and expediting the preliminary work of investigation and design. This work had to be done quickly, without much knowledge as to the locations and sites of the cantonments and camps, transportation, living and construction conditions; scope of initial or ultimate project; and extent to which plans and specifications would have to be altered almost overnight to comply with the changing needs of the Army, as developed by experience, overseas and at home.

The facts mentioned made it impossible to let fixed price contracts except for material and for minor parts of the work. There was no opportunity to secure lump sum or even unit price bids because the Government was unable to furnish information, plans, or adequate specifications, and information was lacking as to the amount, character, and location of the work and working conditions. It was therefore evident that the services of contractors must be enlisted on some basis which would admit of working out all features and problems without incurring delays, through changes or additions, or creating complications which would be to the disadvantage of the Government. Insistence on doing this construction by prewar Government methods, which required the letting of lump sum or unit price contracts, would have resulted in losing valuable time, many lives, and possibly the War. To expedite this emergency construction work, the Secretary of War declared, on April 12, 1917, that an emergency existed in the meaning of section 3709, Revised Statutes, under which emergency construction could be carried on without advertising and taking competitive bids.

These conditions demanded:

1. That a form of contract as to plans should be developed which would leave the Government unhampered and yet assure the building of the requisite structures at maximum speed.
2. That the services of competent and responsible contractors be secured upon whose zeal, knowledge, and experience the Government could rely.
3. That the administrative organizations of the War Department construction arm be changed and made adequate and flexible in order efficiently to design, direct, and supervise all this work. This

necessitated that many experienced men of proven ability be obtained to fill the important positions in the new organizations.

All these conditions were met and the Cantonment Division created to administer the work, which was immediately started, being based on the three primary features above mentioned, namely:

1. A flexible type of cost-plus contract, carrying low compensation.
2. Mutual confidence and cooperation between the Government officials and the contractors selected.
3. The enlargement and development of the construction bureau of the War Department into the Cantonment Division, to administer and direct the work and supervise its execution.

Under this general plan, changed and enlarged to meet requirements, a total of 596 construction projects, ranging in size up to more than \$40,000,000 each, are stated to have been built. Much of this work was carried on simultaneously.

The Committee on Emergency Construction, which was charged with the nomination and selection of contractors, obtained information respecting the qualifications of numerous contractors and thereafter invited many of them to furnish statements respecting their experience, past and current work, and grounds for expecting consideration.

The Government and its representatives received many protests against this plan and pressure was brought upon Members of Congress by those failing to secure work or desiring special consideration. Many argued that competitive bids should be secured. When the requirements of the situation were realized by the largest and most experienced contracting concerns, they showed a general willingness to build the work on this Government plan for the fees fixed and approved by the General Munitions Board.

The indorsement of this plan for performing War Department emergency construction received from the engineers, architects, and builders of the country, their full cooperation therein, and the successful results achieved, indicate its general soundness.

Subsequently, early in 1918, because of questions raised in various quarters as to the wisdom of these methods of construction, and also because of the enlarged program of construction then contemplated, the War Department decided to invite a board of experts to review and report upon these policies and the type and form of the standard contract in use by the then Construction Division on all of its work. This board was composed of the presidents of the principal national engineering societies and of the Chamber of Commerce of the United States, and representatives of labor, contracting concerns, and the public. At its meetings, held in Washington, it considered, among other matters, a summary statement dated March 14, 1918, with which it was supplied, on its request, by the Construction Division.

Because of its full exposition of the general situation and the problems involved a portion of such statement is here quoted:

It was at first decided to build 32 cantonments. This number was later changed to 16. The estimated cost of first original 16 cantonments was approximately \$5,000,000 each. It was thought that additional construction would be added, and this thought proved correct. By successive steps from the time of the commencement of the job until completion work was added in the form of additional hospital accommodations, the addition of divisional depôts, divisional remount stations, complete changes in the military organizations to raise the companies from 200 men to 250 to suit the Pershing Division and to radically modify the general scheme of military organizations and other like changes so that the final cost of the cantonments was in the neighborhood of \$9,000,000 each, nearly all of which increase was due to the additional work rather than to poor estimating in the first place, although the original estimates were somewhat low. It must be borne in mind also that many of these changes, particularly those caused by the changes in the military organizations, were not decided upon until after the 1st of September, when the contractors were in some cases practically finished with their original jobs and had in several cases materially decreased the organizations.

In the case of the two largest port terminal developments now under construction the plans were fairly well decided upon and construction started on the basis of the plans fixed. In both cases, after the jobs had gotten some weeks along and the organizations were commencing to show material results, in some cases having several thousand men on the job, construction had to be absolutely stopped, due to the direction of higher authority, and these holdups continued until the matter could be again adjusted. In both cases the work is being carried forward under generally the same plans as were originally contemplated but with enough modifications to seriously affect any lump-sum contract. It also developed at one of these terminals that instead of being able to build one-story buildings on the ground, as was originally thought possible, it was necessary to pile for the entire area, including the support of the floors. In another case, the location of the buildings which had been started was changed and construction delayed while additional filling could be done at the new site. An additional pier was added to the project.

Taking one of the Ordnance depôts as a sample, the plans for the general development were fairly well settled and construction work was laid out and started on the basis of building about eight magazines to start with, with plans for increasing this number as necessity demanded. After the construction work was started it was decided by the Ordnance Department to add several hundred thousand square feet of building space for use in connection with the carriage department, which had formerly had no connection with the job at all. This necessitated considerable changes in the railroad arrangements. After the work had gotten well under way again it was suddenly found necessary to add a cantonment to house 5,000 troops, which had not previously been considered as even a remote possibility in this connection. It was also necessary to get the housing for these troops in the shortest possible time, which necessitated radical changes in the construction organization, sacrificing the organization on the original contract to make possible the necessary speed under the new conditions.

In the case of a shell-filling plant for the Ordnance Department, that department had started out on a small construction project for a plant for filling shells with poisonous gas. It was apparently not originally contemplated that this would be a plant for any other process than filling the shells themselves with this gas. The Ordnance Department had started the construction of this plant previous to the time when the Cantonment Division was directed to undertake all construction work. The contracts used by the Ordnance Department were something special and are now the subject

of considerable negotiations as to their actual meaning. In the meantime it has been decided to add to this plant, which was originally thought to involve an expenditure of a few thousand dollars, a chlorine plant, a large power plant, and other parts necessary for the complete manufacture of poisonous gases as well as loading them into shells, so that the total expenditure as now contemplated is stated to be over \$30,000,000.

The above samples may be taken as representing the condition on most of the work which the Cantonment Division is doing. There have not been many jobs where the changes or difficulties as affecting contractual relations have been materially less than those above enumerated.

Following its review, the board of experts presented, on March 15, 1918, a comprehensive report, of which a copy is annexed as Exhibit 3, expressing its approval, for war emergency work, of the construction methods adopted and of standard cost plus a sliding scale with fixed maximum fee contract, and gave at length the reasons for such conclusions.

The work and plant facilities which were built under this standard contract by the Cantonment Division and by the Construction Division appear to have been supplied on time. Speed was made the controlling consideration, as it was essential that the approved construction program should not lag or fail regardless of the radical and sweeping changes in plans which frequently had to be made to suit revised Army requirements or to utilize the only suitable materials that were available.

Bureaus dealing with new problems could not always at once define their needs with such accuracy that their projects could be pushed to completion on fully predetermined lines. It often was necessary for the Construction Division to start work as soon as the expenditure was authorized and to develop plans and meet difficulties as it best could, as the work progressed, in cooperation with the requisitioning bureau. Liaison officers were furnished by the requisitioning bureaus and attached to the Construction Division to secure proper coordination. The officials of most of these bureaus have stated their approval of the work of the Cantonment and Construction Divisions. Some expressed the opinion that their own bureau organization could have done its building work as well as or better.

Expenditures on War Department emergency construction done by or under the Construction Division aggregated about \$1,000,000,000 at the time of the armistice, all of which was executed under the standard contract. This contained a clause fixing a definite maximum limit for the contractor's fee, anything in the contract to the contrary notwithstanding. The saving to the Government, due to fixing a maximum limiting fee, proved very valuable and, on the 16 National Army cantonments alone its insertion is estimated to have saved about \$5,000,000 in fees otherwise payable.

As the standard form of Contract for Emergency Work had been thoroughly tried out and proven effective on the early cantonment and camp construction, was widely known and contained a schedule of fees for contractors' services that averaged lower than those in use by any other bureau, it is difficult to understand why many of the other Government bureaus did not use it or at least adopt its limiting fee clause in their construction contracts. Some of these bureaus placed percentage contracts, without limit to fee, with contractors who also did work under the standard contract either on a lower fee basis or for a much smaller percentage due to the operation of this limiting fee clause. This would indicate that the former method was unnecessarily wasteful. Moreover, when, on these unprotected percentage contracts, projects were increased much beyond the size originally intended, the fees payable were much greater than they would have been if this limiting fee clause had been incorporated as they increased in proportion to the increased cost.

Some construction was done by concerns having such control, through special knowledge of processes or by patent ownership, of materials needed by the Government that it could not induce or compel them to do work except for such fees as their representatives demanded on construction as well as on production. Competition not being obtainable the purchasing bureau had, in these cases, to make the best terms that it could. This condition seems to have arisen more on construction contracts placed by the Ordnance Department than on the work of other bureaus.

The Board of Review found little evidence of dishonesty in War Department construction work. It believes that the greatest losses to the Government were not due to dishonesty but were caused by the use of inadequate methods and of men who were unfit or incompetent for construction tasks put upon them. The giving of important positions to men who were untrained in the work they had to direct was costly and jeopardized the success of the War program. It may have been thought that such men would be less apt to use their positions to overdo their work or to profit by contracts placed with their former associates, overlooking the fact that incompetency of officials invites dishonesty because of their inferior capacity to detect or stop it. Whatever the reason, vacillation and inaction were assured while such men were learning their tasks. No method more costly or more likely to cripple the work of the Army could be adopted, as the extra costs of a prolonging of the War by delays due to inefficiency of this kind could easily run into hundreds of millions of dollars and thousands of lives.

Contracts often had to be placed with companies whose stockholders, officers or employees were members of the procuring or pur-

chasing bureaus. This statement applies principally to the civilian bureaus, including the Council of National Defense and War Industries Board, and to the military bureaus whose officers were drawn from civil life. This procedure was unavoidable, as the purchasing could not be done by men devoid of experience or knowledge of the work. When properly safeguarded this method was for the best interests of the Government because it needed in its service the ablest men of each industry, and any law or construction of law forbidding purchases from the former associates of these officials would have placed responsibility for the conduct of the war upon the mediocre instead of the best brains of the country. The best method of retaining the advantages and avoiding the disadvantages of such relationships was found to be the use of other disinterested men or boards to check and pass upon all such contracts. This protected the interests of the Government and avoided proper criticism of its experts, advisers and executives. The plan developed under the General Munitions Board, and first used on cantonment work, for dealing with this purchasing problem proved effective in protecting the Government's interests against losses and in finding and using the most efficient men available. It provided an independent committee of specially qualified experts to investigate and nominate contractors for War Department construction; another organization composed of engineers and constructors to administer contracts and to design and supervise all work and negotiate prices for materials; and a special Board of Contract Review to pass upon orders and purchase contracts after these had been specified by one group of men in the Engineering Division and placed by another group in the Procurement Division.

The Board of Review did not make audits of War Department construction accounts because it found by investigation that such would not show the most important facts, would give an incomplete picture, and would seldom furnish comparative unit costs, the only proper measure of efficiency and economy when corrected for inequalities of conditions. Audits would disclose generally what became of the money that was expended and whether the proofs of expenditure required by the Government accounting system had been secured, but would not disclose losses arising from the inefficiency or inadequacy of the administrative organization or the field forces, and would fail to show what the Government received for its money in essential speed or quality of work.

But even if it were possible to determine comparative unit costs there would still remain the questions whether the necessity for speed justified the expenditures; whether any of the costs were avoidable and how, and with what period and scale of prices comparisons should be made? The board accordingly decided that it was war-

ranted in making accounting investigations and cost comparisons in certain cases only, the results of which are given later.

The Annual Report of the Chief of Engineers for the year ended June 30, 1918, states that on such date there were in service a total of 7,963 Engineer officers, made up of officers of the Corps of Engineers, Regular Army; National Guard Engineer officers; Engineer officers' Reserve Corps; Engineer officers, National Army; Railway Transportation Corps; that the total enlisted strength of Engineer units was 214,274, of whom 130,000 had embarked for foreign service, these enlisted men being used on the overseas construction work of the Army; that the number of Engineer officers of the Regular Service engaged in construction work in the United States during the war was very much smaller than usual; and that this reduced amount of construction was done with the assistance of retired officers, formerly of the Corps of Engineers, and by the aid of trained civilian assistants.

The Army construction in this country was done by civilians working under civilian contractors and civilian supervising engineers and supervised by a commissioned personnel of the construction division which was recruited from civil life.

The foregoing outlines the essential differences between the construction methods employed abroad by the Engineer Corps of the Army and those employed in the United States by the Construction Division of the Army.

The above-described condition of overload on the Army engineering organization was the inevitable result of the war demands for engineer officers. Anticipation of such a development was one of the primary reasons for creating the Cantonment Division, later the Construction Division of the Army, which, in order to avoid hindering the development of the military program, was created of civilian engineers to handle war emergency construction in the United States, to function along commercial lines and to be coupled with the Army only to such an extent as conditions rendered necessary.

Engineer Reserve officers returned from overseas have expressed the opinion that the apparent need for military engineer officers trained for combat work is such that the War Department will be occupied in meeting it without also attempting to meet the needs of the Government for men expert in civil construction and engineering and that no single engineering or construction organization can be expert on both lines of work.

Many other statements respecting overseas engineering and construction work have been made to its members by officers whose views carry weight in business and engineering circles. The board does not attempt to pass upon these statements but does strongly recommend that thorough investigation be made as to the facts

because of the importance of the statements made, the broad circulation which they have been given, and the inability of those still in service to engage in public discussions of these matters or to refute misstatements or overstatements.

With respect to these and related matters the board is of the opinion:

That as, under peace conditions and to a large extent under war conditions also, nearly all construction and the engineering incidental thereto is of a civil character, the principal exception in each instance being that which relates to artillery and combat work, civilian engineers and experts must constitute the main reliance of the country for the construction work of both peace and war.

That as time does not permit including thorough and varied training in practical commercial work in the education of Army engineer officers they will be outclassed by civilian engineers on most construction work, but should nevertheless be given as much of such training as possible, because they will otherwise become a clog instead of a help to those whom they may be called upon to direct but whose work and problems they can not properly understand without it.

That, so far as practicable, the directing and executive engineers on most Government construction should be drawn from civilian life, be unhampered in their work by differences of military rank, and stand on a peace and not a military or war basis as to classification and relationships.

That it is unwise to ask the War Department to do any national construction and engineering work that civilians can do because, in another war, its engineers will again be unable to handle such home work in addition to their military work, and that the practical training given to Army engineers in peace time should be provided by detailing them to work on construction on a parity with civilians, as any plan which gives them the special status of military rank on construction work will prove unsatisfactory because Army rank tends to insulate them from the most educational features of the work.

That, if the organization handling the Nation's construction in times of peace were directed by the War Department it would, in time of war, be disrupted by the calling of its chief into active service at the very time it was most urgently needed for war emergency work.

That, as the value of the Officers' Reserve Corps has been so conspicuously proven on war construction work at home and overseas and as, in time of war, the Nation must rely largely upon such a corps, its development and training should receive the fullest encouragement from the War Department.

The board is impressed with the benefits which were secured by consolidating the construction work of various War Department bureaus, and believes that much other Government construction could be

merged to advantage, and that national preparedness for peace or war would be effectively promoted by creating one construction department with an essentially civilian organization and personnel to administer and supervise all government construction except that of a technical military character. Such a department could handle more expeditiously and economically than the War Department many construction problems, which, in the past, have been loaded on to the latter, which can not be made an efficient peace time administrative construction department because its functions are essentially military and its operations are hampered by complications of military organization and rank inseparable from Army activities. The projects of such a construction department would afford better opportunities for the practical education of Army officers, and cost the Government much less, than the present plan of placing much of such work under the War Department. All of the principal national engineering societies advocate the formation of a construction department of the character above described.

The foregoing conclusions and suggestions for improvements differ in no essentials from those given in the following statement, furnished under date of May 7, 1919, to the Board of Review, in response to its invitation, by a constructor of broad experience, Mr. F. L. Cranford, director of construction, United States Nitrate Plants, War Department, who was appointed to that position on July 27, 1918, by the Secretary of War, whom he represented in connection with three nitrate projects for which the authorizations totaled approximately \$100,000,000.

There is immediate need of building vast public improvements, such as roads, railroad terminals, dock facilities, hydroelectric and steam power plants, irrigation and drainage projects, and flood control works. The public must have confidence that this work is handled efficiently, free from the taint of corruption; that its promotion is based upon sound economies and not influenced by selfish political consideration. In carrying out this great Government work, in the light of the lessons of the past, the creation of a centralized organization is important, first, because a central organization can be more efficiently and economically managed and controlled, and secondly, responsibility can more readily and directly be placed.

Such an organization to be successful must have competent executives who measure up to the work. With a single organization handling such tremendous Government work, inefficiency should promptly show itself, whereas it would be almost impossible to bring it into the light of day from the dozens of small Government bureaus. It should, for the time being at least, on account of the magnitude of the work, also attract an abler personnel than is the case at present. But while this centralization should largely advance efficiency and economy in Government construction work there will be two great difficulties, the solution of which will go far to determine the success of the new department. These two difficulties may flow from opposing principles, but the results are largely the same. They are politics and civil service. If the executives of such a department are chosen for political considerations and not primarily upon the basis of ability and fitness, the department will always be lame. Furthermore, an attempt should be made to develop a permanent staff, which in considerable part should

not be subject to civil service—that is, with the men in the more important positions subject to “hire and fire.” With all the improvements civil service has accomplished in the past half century, it has also had its disadvantages, and it seems almost impossible to maintain a large public staff for any length of time under civil service rules without it being filled up with “dead wood” and “dry rot.”

While I strongly favor the idea of a centralized department for carrying on peace-time construction work, I have no great confidence that it will be more available for war work than the various construction bureaus were at the beginning of this war. If this centralized department is established as soon as peace is declared, we shall go back to peace-time standards, including the carrying on of construction work on the basis of complete plans and rigid contracts. The new organization can work a wonderful improvement in the development and administration of such contracts, but its work would be inherently different to war time work such as that of the Construction Division in this war.

I do not wish to prophesy dogmatically, but my expectations are that if we should have another war after the construction department had been in operation for, perhaps, 10 or 15 years, we should find, in addition to the “dead wood” and “dry rot” that I have referred to, that the working forces of that department were so wedded to the various rules and regulations that it would again be necessary to organize a Construction Division of the Army. The centralized department ought to give us this advantage; a common reservoir of information as to Government projects, and, by picking out the best talent in it, a nucleus for the war-time organizations.

According to statements made to the board by Army chiefs, dead wood and dry rot exist in other Government bureaus than those under civil service rules and constitute a serious problem for the reason that Army officers and enlisted men are included among those who are immune from “hire and fire.” They point out that Army methods do not provide effective means to get military incompetents out of the way in order to make room for better men, as their superiors hesitate to attempt to force inefficient men out of the Army before their age limits are reached in cases where they have no other income or part pay on which to live.

The board also finds that—

Retention of other Army methods unsuited to emergency construction conditions, such as dispersion of authority over funds and failure to give the construction bureau control of its accounting, caused unnecessary confusion and hampered construction work.

The personnel engaged on War Department construction, most of whom worked along the lines of their prewar experience, was more familiar with the practical and business requirements of war work than most of the other bureaus of the department. On some war work few experienced men were available because of its novelty and time was required to find and train suitable men and to develop proper plans and methods. This necessitated delay by some of the bureaus in the determination of their construction programs which were further complicated by the constantly increasing needs of the overseas forces.

Political influence was not a disturbing factor in war emergency construction work and there is good ground for belief that it would not prove detrimental to the peace-time operations of a consolidated construction bureau handling all ordinary Government work.

There was no inconsistency, as has been suggested, in placing the war emergency construction work under the director of operations of the General Staff instead of placing it under the Division of Purchase, Storage and Traffic on the theory that it was in a sense production work. Production usually comprises quantity work done by factory processes of more or less routine character, while construction relates primarily to single and often differing structures built by special field methods to suit varying conditions. In many cases it includes the facilities preliminary to or needed for production. The two activities are so essentially dissimilar as to render their combination undesirable.

SECTION 4.

WAR DEPARTMENT CONTRACTS FOR EMERGENCY CONSTRUCTION.

The first War Department contracts for emergency construction work were placed early in May, 1917, for a number of the Army increment camps. These were in the form of a brief letter prepared by the legal bureau of the General Munitions Board of the Council of National Defense and signed by the Quartermaster General of the Army. The letter was sent to each of several well-known contracting concerns. It directed such concern to proceed with the construction of a camp in accordance with instructions which would be given it from time to time and in accordance with the terms of a contract, equitable to it and to the Government, which would be delivered later for execution, its compensation to be on the basis of cost plus a percentage. Each of the concerns addressed accepted the order by signing a footnote thereon, stating that pursuant to this understanding it would proceed at once with the construction named. This arrangement effected the immediate starting of the work and left the Government in full control. The contractors obligated themselves under these agreements to make large commitments and expenditures, which were promptly incurred, notwithstanding the fact that there were then no funds available to pay them, as Congress had not appropriated funds for the work, and that their memorandum orders gave them no assurance as to the terms of the proposed contract.

Shortly after the declaration of War by the United States, the Committee on Emergency Construction of Buildings and Engineering Works, generally known as the Committee on Emergency Construction, a subcommittee of the General Munitions Board, had started to determine the requirements for the form or forms of a construction

contract suited to war emergency conditions. It studied the construction needs of various bureaus and held conferences with the representatives of the legal and other departments of the Government, including the Judge Advocate General's Office, the Treasury Department, the Navy and the War Department. It also conferred with engineers, architects, and constructors, and representatives of accounting, contracting, and labor organizations.

Labor was represented in the placing of the emergency construction contracts of the War Department through the appointment, at the instance of the Secretary of War, of a representative of the building trades as a member of the Committee on Emergency Construction. This was done subsequent to the execution on June 19, 1917, of the so-called Baker-Gompers agreement, made effective June 1, 1917, between Mr. Baker, the Secretary of War, and Mr. Samuel Gompers, president of the American Federation of Labor. It is understood that this committee member was appointed to look after the interests of organized labor as well as those of the Government and that his views and interpretations were generally taken as acceptable to both parties. His dual responsibility, involving an apparent contradiction of supposedly conflicting interests, seems to have been properly discharged, as the other members of the committee state that, when conflicts occurred, the interests of the Government did not suffer through him. This arrangement also helped to accomplish the essential requirement that strikes, involving interruptions and loss of time, be prevented.

Government precedent dictated the use of the lump sum or unit price form of construction contract made upon competitive bids based on definite plans and specifications. Under such form of contract the interests of the Government and the contractor are opposed, as a greater cost for given items means a lesser profit and there is an inducement for the contractor to deliver as little as possible in quality and quantity and for the owner to ask as much as possible. This creates delay instead of speed, antagonism instead of cooperation, and conflict instead of unity of interest. It was the judgment of the Committee on Emergency Construction that the creation of such conditions would be fatal to the speedy execution of the war emergency construction program. Foreign experience had shown that the necessary speed could be obtained only by maintaining identity of interest and the fullest cooperation among all participants.

The evidence presented to the Board of Review shows that the conclusions were reached by those in authority that neither the lump sum nor the unit price contract could meet the needs of war emergency construction; that a form of contract securing a high rate of speed was essential; that this would necessitate the assumption

of financial and other hazards by the Government and the selection of contractors on the basis of merit, integrity, and experience; and that, by adopting such tests of fitness and competency as controlling and the principle of paying a fair compensation for the best construction services obtainable, the Government would be saved embarrassments, losses, and delays certain to result from accepting the lowest bid for services, as such would usually be offered by concerns of inferior experience, capacity, or desirability.

The basic requirements in order of importance were determined to be:

Speed—or delivery of work in time required.

Quality—or maintenance of necessary standards.

Cost—or lowest expenditure consistent with the foregoing.

To meet these specifications under war conditions, it was decided that the work must be at all times under the control of the Government through its representatives; that services must be equitably compensated; and that methods and procedure must be such as to utilize and strengthen existing construction organizations for Government use and not to impair or destroy them.

The Government had to be free at all times to change its program or requirements without delay and at the least expense. Such changes would necessarily be frequent. A multiplicity of related operations and much complex construction had to be carried on simultaneously, and changes in one would often involve changes in others.

It was determined that performance of the construction work under Government supervision and a contract calling for the payment of its actual cost, plus a fee for the contractors' services and general expenses, would fill these requirements, provided that an equitable and automatic reduction were made in the fee if, by curtailment or otherwise, the actual cost should prove to be less than that estimated. These war needs were believed to be met by a method developed by experience on private work and much used on such construction where working conditions or costs were unknown, or where the owner wished to save time by starting construction in advance of the development of complete plans and specifications or wished to carry his own risks in order to secure at minimum cost the benefit of the contractor's skill.

With the object of meeting these conditions the Committee on Emergency Construction drafted a single standard form of construction contract known as the "cost-plus with sliding scale and fixed maximum fee" plan. This was ratified by the General Munitions Board after its basic principles had been approved by the Secretary of War. Under such contract it was expected that work of the character and magnitude then contemplated could be built quickly

under congested transportation conditions, soaring prices for materials, and probable shortage of labor. This was the standard construction Contract for Emergency Work which was used initially on the cantonment and camp work. The committee assumed that the contractor selected, who would be one of several nominated by it, would be of integrity, reasonably efficient, with a suitable organization, and willing to apply his skill to performing the work speedily and efficiently; that the Government would be equipped for administering and would issue the necessary instructions for and supervise the execution of the work; and that, in general, the functions of the Government would be administrative and supervisory and those of the contractor would be executive.

The contract granted the Government authority and supervision over the contractor's activities, pay rolls, auditing, and purchases of materials, and aimed to establish all needed safeguards without restricting the contractor in the free application of his special knowledge and abilities. It made no attempt to load upon the contractor risks involved in the work. It permitted starting work when the contractor was ready, irrespective of whether the Government was ready to state all its needs or lay down its full requirements, and rendered unnecessary the payment of prohibitive prices or excessive profits because of any indecision or changes on the part of the Government.

In most cases, especially on the cantonments, the engineering, making of plans, procurement of materials, formation of field organizations, and the building work itself had to proceed simultaneously. A contractor desiring to bid on these projects could not have done so as plans and specifications could seldom have been furnished him and the markets for material and labor were in a period of extraordinary instability. The lack of plans was partly due to the lack of information from overseas as to Army requirements and to the necessity of pushing field construction while determining these requirements and developing the designs to meet them.

The contract allowed the contractor to include in the cost of the work only those expenses which were actually incurred for and were directly chargeable to the project and required that his general office overhead costs be paid out of his fee. In some instances these included substantial sums for the use of capital employed. The contractor's fee was determined from a sliding scale of percentages based on the cost. There was a limiting fee provided in every instance, and after the issuance, in February, 1918, of the third edition of the standard form of Contract for Emergency Work, it was the practice of the contracting officer to insert in a blank space left therefor a maximum or limiting fee, ascertained by applying the standard schedule of fees to the estimated cost. This eliminated so-called percentage

contracts. The contractor had, under these conditions, no incentive to overrun the estimates and every incentive to finish the work speedily, so as to stop his overhead expenses. The Government, however, benefited by an automatic reduction in fee, through the application of the schedule of fees, if, by change or curtailment, the actual cost proved less than the estimated cost.

The Cantonment Division, and later the Construction Division, used this standard form of contract for all work done. The first work let thereunder was for 16 National Army cantonments and 16 National Guard camps. In each of these contracts the maximum fee payable to the contractor was limited to \$250,000. The sliding scale of contractor's fee ranged from 6 to 10 per cent in the first and second editions and from $2\frac{1}{2}$ to 7 per cent in the third and fourth editions of the contract, according to whether the projects were large or small. Smaller projects carried the higher percentages, because of their proportionately higher overhead costs. The third edition was issued when larger projects were being undertaken and when private construction had nearly ceased and the only work of importance being undertaken was for emergency war construction.

Because of the magnitude and cost of the work done and the application of the limiting or maximum fee, the gross fees paid to contractors on the 16 National Army cantonments ranged from $2\frac{1}{2}$ to 4 per cent, and averaged less than 3 per cent, of the cost. Out of these fees the contractors had to meet their overhead, office, and interest costs. It is estimated that after meeting these costs their average net profit was less than 2 per cent. These fees were further reduced through Federal taxation of profits by which the Government reclaimed a considerable portion of the construction fees it paid to contractors. This program of taxation compelled a contractor to return the amount of his tax to the Government out of his fee and correspondingly reduced his bankable net proceeds from the work.

Similarly the gross fees paid to contractors on the initial construction of the 16 National Guard camps, which averaged in cost about one-fourth that of the cantonments, ranged from 6.38 per cent to 7 per cent, averaged 6.88 per cent of the cost, and were also subject to deductions corresponding to those above mentioned.

On some still larger projects, later constructed under this Contract for Emergency Work, the Construction Division had the work performed for a gross fee to the general contractor of about $1\frac{1}{4}$ per cent, from which the contractor had to meet his expenses and taxes.

Under the form of construction contract used the Government, in effect, hired the services and organizations of experienced contractors, many of whom, for patriotic or business reasons, were willing to do work at almost any fee the Government might consider fair. The principal advantages to the Government of this contract, however,

appear to have been the complete control it secured of its own work and the opportunity for an incentive to speed rather than limitation of the fees paid.

Four editions were printed of the standard form of Contract for Emergency Work, the last three bearing dates of October, 1917, February, 1918, and June, 1918, respectively. In the last two editions the schedule of fees was reduced, as has been explained; the fees were limited in advance to amounts ascertained by applying the current sliding scale schedule of fees to the estimated cost, thereby fully abandoning the payment of fees based on a percentage of actual cost; the rentals of construction equipment were revised; and some minor modifications were made.

Because of questions raised and in view of the large volume of construction work expected to be done under the Contract for Emergency Work, the War Department determined to have the form of contract and the policies which it embodied passed upon by a committee of eminently qualified experts. It appointed such a committee, consisting of the presidents of the American Society of Civil Engineers, American Society of Mechanical Engineers, American Institute of Electrical Engineers, American Institute of Architects, Chamber of Commerce of the United States, and General Contractors' Association of New York, a representative of the American Federation of Labor, and a representative of the Building Construction Employers' Association of Chicago.

The committee visited Washington, secured desired facts and data, and on March 15, 1918, in a unanimous report, reviewed many types of contract, stated their advantages and disadvantages, advocated the use on war emergency construction of the cost-plus, a sliding-scale fee form of contract, pointed to its equitable operation in practice, and commended its advantages to the Government as to speed, flexibility, and reasonableness of fee. For further details reference is made to the report itself, a copy of which is annexed as Exhibit No. 3.

The Construction Division of the Army was created about this time and was charged with the handling of all emergency construction work of the War Department. Its construction program was enlarged from time to time until it covered the handling or supervision of 596 construction projects of which the names are given in the list entitled "Projects of the Construction Division," of which a copy is annexed as Exhibit No. 1. These projects were all built or contracted to be built under the standard Contract for Emergency Work, executed by the chief of the division as contracting officer for the United States, except in cases where a contract had been made by the requisitioning bureau.

This type and form of contract warrants careful study. It is essentially a contract for service to be rendered by the contractor. A copy of the fourth edition of the contract is annexed as Exhibit No. 2. Its substance is given in the following paragraphs.

The contract recites the existence of a national emergency, the urgent need by the United States of immediate performance of the work, the necessity of its completion within the shortest possible time, the advisability under disturbed conditions existing in the contracting industry throughout the country of departing from the usual procedure in the matter of letting contracts, and the need of adopting means to secure the most expeditious results.

The contract provides that the drawings and specifications are to be furnished by the United States through its contracting officer; that the work is to be subject in every detail to the supervision and direction of the United States with the right to make changes, additions and omissions without affecting the contract provisions; that the title to all work completed or in the course of construction is to be in the United States; and that all tools and supplies for which the contractor is entitled to be reimbursed are to become the property of the United States.

The contract further provides that the contractor is to be reimbursed for such of his actual net expenditures as may be approved or ratified by the contracting officer and as are included in certain stipulated items; that this cost is to include the rental of construction plant at rates not exceeding those mentioned in an attached schedule with the provision that when the total rental paid equals the valuation filed for each part of such construction plant no further rental shall be paid and the title shall vest in the United States; that "No salaries of the contractor's executive officers, no part of the expense incurred in conducting the contractor's main office, or regularly established branch office, and no overhead expenses of any kind, except as specifically listed above, shall be included in the cost of the work, nor shall any interest on capital employed or on borrowed money be included in the cost of the work"; and that the contractor is to take advantage of all discounts available and to apply in reduction of the cost of the work all revenue from the operations of the commissary, hospital or other facilities, or from rebates, refunds, etc.

The contract further provides that "as full compensation for the services of the contractor" he is to be paid a fee which is to include profit and all overhead expense except as specifically provided and in effect that the total fee to the contractor shall in no event exceed a definite sum therein stated, which sum, in the third and fourth editions, is fixed by the estimate of cost available when contract is made and by the corresponding fee in the schedule of fees forming

part of the contract; this schedule being made up of successively increasing amounts expressed in dollars, alternating with successively decreasing percentages of the cost; that the contractor is to receive no additional compensation if the cost of the project is increased unless the Government is willing to grant it; that if the cost of the work is reduced the amount of the fee is to be automatically reduced in accordance with the schedule of fees; and that work may be curtailed or abandoned without detriment to the interests of the Government and without creating any ground for claimed fees or profits on other than work actually performed (the two last named provisions proving of great value to the Government when effecting cancellations of hundreds of these contracts after the armistice); that the contract can not be assigned or subcontracted in whole or in part without the consent of the Government; that disputes not otherwise disposed of are to be submitted to the Secretary of War for a decision which is final and binding upon both parties; and that laborers and mechanics are to be employed on a basic eight-hour day with overtime at an increased hourly rate permitted by the provisions of an Executive order relating to certain classes of contracts or to emergency conditions.

It is stated by the chairman of the Committee on Emergency Construction that the policy followed in framing the Contract for Emergency Work was to attract contractors of the best type to Government construction and retain them after completion of their initial contract, and that to this end it was provided that the Government should carry its own risks and the costs arising from haste and changes incident to war conditions. Wide variations in conditions attended this work. One contractor who built a \$10,000,000 cantonment project stated that his investment in plant was about \$35,000. For this he received rental. Another contractor who built an Army Supply Base at a cost approximating \$25,000,000 and requiring two or three times as long as the cantonment for its execution, stated that his investment in plant, in addition to plant rented from outside parties, was about \$1,100,000. For this he received rental. In each of these cases the fee, limited in advance, reached the maximum of \$250,000. The contract obviously fails to accord equal treatment to these two contractors as it does not differentiate between them in the matter of fees. This was explained by the chairman of the committee, who stated that it was believed that a contractor was entitled to a 2½ per cent gross fee on a \$10,000,000 contract and also that \$250,000 was a large enough fee for almost any project, considering all the conditions.

The standard contract does not allow a contractor to charge an additional fee for extra work ordered or performed on a project unless executed under a new contract. It was stated by the chief of the

building division of the Construction Division that it was customary to make such a supplemental contract when the contractor was believed to be equitably entitled to it, as in cases where additional work was required which might have been let to another contractor but for which there was no reason for changing contractors.

Many Government needs could not be contracted for on fixed-price contracts under war conditions and under the prevailing uncertainties as to cost and availability of material and labor, and in some cases, the Government had to change fixed-price contracts into cost-plus contracts to obtain deliveries. A clear statement on this subject is given in the following extract from "Recommendations on contracts" copied from printed pamphlet, issued July 31, 1917, entitled "Uniform Contracts and Cost Accounting Definitions and Methods," approved for submission to the departments of the Government by an inter-departmental conference composed of the following representatives: Department of Commerce (2), War Department (11), Navy (7), Federal Trade Commission (3), Council of National Defense (3), War Industries Board (3), Institute for Government Research (1).

Although a straight purchase-and-sale contract for a fixed price adjusted as indicated is greatly to be preferred, nevertheless in numerous instances the United States will be obliged to obtain production by paying for the entire cost of the same and in addition a fair profit to the contractor. Such cost-plus contract may be necessary under the following conditions:

(1) Where the production is novel and the contractor has had no past experience upon which to base a price; for example, steel helmets, large caliber guns and shells for same, aeroplane motors, and the like.

(2) Where the production involves difficult and complicated manufacturing effort subject to changing plans and specifications, or wide fluctuations in material costs; for example, steel and wooden ships, aeroplanes, optical glasswork, and the like.

(3) Where the contractor, though deserving of confidence, lacks sufficient working capital and plant equipment to carry through the job.

(4) Engineering or building jobs for which the cost-plus contract has for many years been standard.

It must be borne in mind that a cost-plus contract establishes a relation of trust between the United States and the contractor, in which the contractor is legally responsible at all times to work in the interest of the United States and receive no profit beyond that definitely specified in his contract. For all excessive costs, hidden profits in the form of depreciation, overhead, discounts and the like, the United States may refuse to pay, or if the contractor has thereby profited may sue and recover. Practically, however, the interests of the United States and the contractor are inevitably opposed if the profit is based upon a percentage of cost. The temptation is great to the contractor to inflate his own costs, as well as the costs of subcontractors, and the task of the United States is difficult and burdensome in checking and determining proper costs.

III. It is recommended that in cost-plus contracts a fixed profit of a definite sum of money per article be agreed upon instead of a percentage of cost.

* * * * *

IV. It is recommended that in cost-plus contracts the fixed profit agreed on be subject to adjustment so that the contractor may share in the saving of, or be charged with part of the excess of, actual cost over estimated cost. * * *

V. It is recommended that a standard form of cost-plus contract be adopted for use wherever practicable. As conditions necessitate changes, the form of such standard contract can be changed to suit.

Some of the cost-plus contracts attained much publicity and were the subject of special investigation, as in the case of aircraft production. Reference is made to report made thereon by Judge Charles E. Hughes, October 25, 1918, and concurred in and transmitted to the President by the Attorney General, October 31, 1918, for a statement of the disadvantages often incident to this type of contract for multiple production of aircraft in factories and of the reasons for using other forms of contracts therefor. Scrutiny of this report does not indicate that, except for some of the accounting work entailed, many of these objections apply to War Department construction when performed under the standard Contract for Emergency Work in which the Government exercised full control and the contractor had no opportunity to derive profits beyond his fee. The following extracts are taken from this report:

CONTRACTOR'S PROFITS.

Under the various fixed-price contracts it is probable that large profits have been gained, but definite information as to their extent would not be available without a survey in detail of manufacturing conditions and costs in a considerable number of plants—an undertaking which would have been wholly impracticable in this inquiry. The profits allowed by the cost-plus contracts present a distinct question.

The justification for cost-plus contracts was found in the fact that the undertakings were novel and that the manufacturers did not have accurate data upon which to make a satisfactory estimate of the cost of production. This was conspicuously true in the case of airplanes of types with which manufacturers in this country had been unacquainted previously. For production in large quantity either new plants or greatly enlarged facilities at existing plants as well as special tools would be required to meet an exigency of uncertain duration, and it would also be necessary to procure the requisite labor and materials for the new undertakings in a rising market and to provide working capital for long periods; and, while motors had been manufactured here upon a large scale, the newly designed engines for the service airplanes required such a reduced weight per horsepower and such delicacy of construction, that it was felt that the enterprise had many elements of uncertainty. In these circumstances it was not an unreasonable conclusion that if contracts for the new types of airplanes and for the new engine were offered solely on a fixed-price basis, either manufacturers would not undertake the work or would insist upon high prices as a safeguard against the chances of ultimate loss. It was deemed inexpedient for the Government to undertake the manufacture directly, and it was decided to adopt the alternative of an assumption by the Government of the cost of manufacture through contracts upon a cost-plus basis. This practice, however, could not properly outlast the reasons which may have justified it at the outset. Contracts of this sort lead to waste, foster abuses, and impose an almost intolerable burden of cost accounting, in itself a hindrance to rapid production. Early in this inquiry it was abundantly shown that it was highly important to establish reasonable fixed prices whenever experience afforded a fair basis for estimates.

The principal features of the cost-plus contracts for airplanes and engines may be said to be these:

- (1) The payment by the Government of the contractor's outlays for labor and materials and for the overhead charges incident to the work;
- (2) The payment by the Government for special tools and certain "increased facilities" located in the contractor's plant, but owned by the Government;
- (3) Reimbursement by the Government for depreciation;
- (4) A fixed profit to the contractor; and
- (5) The fixing of an estimated cost, or "bogey," and a division of whatever saving was effected under this estimate so as to give 25 per cent of this saving to the contractor as additional profit.

It will be observed that by this method the contractor is assured not only the payment of the cost of labor and material used in the process of manufacture, but of administrative outlays for management and supervision, and an allowance for depreciation of plant. To the extent that these payments are made promptly and at short intervals, the working capital required would be reduced. Provision has also been made for the supply of needed assistance by means of advances through the War Credits Board where these are deemed to be justified. The contractor is guaranteed a certain profit regardless of cost. This is called the "fixed profit." And finally, the fixing of a "bogey" cost was designed to counteract the temptation to wastefulness by giving the contractor a substantial share in the fruits of economy. And it may here be noted that, the popular impression that under this form of contract the contractors receive the same amount of profit, however, wasteful they may be, and have no incentive to avoid unnecessary outlays, is without foundation. The bogey costs were in all cases placed so high that the contractor had every reason to expect that the actual cost would be much less and that through its share in this saving the contractor would be able to derive an increased profit from economical management. It is apparent, however, that with a large fixed profit guaranteed the incentive to economy is not as strong as when the entire venture is at the contractor's risk. And particularly when interruption of work and changes in design vex production managers, and it is difficult to maintain economical methods, there may easily be bred an indifference to an excessive cost where its burden falls upon the Government. At least this is to be inferred from conditions in certain plants, and the conclusion is unescapable that the cost-plus system of contracts for the manufacture of commodities, as distinguished from such contracts for mere service, is a vicious system and is to be tolerated only during such period as it is found to be absolutely necessary to secure immediate production.

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LIBERTY ENGINE CONTRACTS.

The bogey cost, as first fixed in the contracts for Liberty engines, was \$6,087. This was approved by Mr. R. H. White, of Cleveland, and Mr. Henry May, of Buffalo, to whom the propriety of the estimate had been submitted by the Secretary of War. The fixed profit as originally stipulated was 15 per cent of this bogey cost, or \$913.05 per engine. Lieut. Col. Hall (who had had large experience in engine manufacture) testifies that he made an estimate about the time that contracts were being let, and told Col. Deeds that \$2,400 would cover the cost of labor and materials for the Liberty engine, without overhead charges.

In December, 1917, the bogey or estimated cost was reduced to \$5,000 and the fixed profit put at 12½ per cent of this sum, or \$625 per engine, and the contracts with the Packard, Lincoln, and Nordyke & Marmon companies were modified accordingly. This was in consideration of further allowances for depreciation and provision for advances by the Government. In last May the contract with the Ford Motor Co.

was modified by the same reduction of the bogey cost and fixed profit. The contracts with the General Motors Co. were put upon the same basis.

Even at this reduced bogey and percentage the profits allowed were very large.

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The revised contract with the Packard Motor Car Co. was made under date of September 2, 1918. It supersedes the original contract and provides for 12,000 U. S. 12s at a fixed price of \$4,000 per engine, and spare parts on the basis of this price for a completed engine. It contains provision as to an increase or decrease of price in case of a change of the cost of manufacture similar to that found in the other revised contracts above mentioned. The Packard Co. agrees to deliver the articles at the rate of 600 engines a month, beginning with September 2, 1918. As the Packard Co. had delivered 3,660 engines up to October 4, 1918, the entire 12,000 will be delivered approximately by December, 1919. It is likely that the cost, distributed over the 12,000 engines, will not be more than \$3,000 an engine, and at this rate the profit on the 12,000 engines will amount to \$12,000,000, with probably \$3,000,000 more as the profit on spares, making about \$15,000,000 in all.

Under the original cost-plus contracts for the Liberty engines; that is, with the bogey cost of \$5,000, a fixed profit of 12½ per cent thereon, and an additional profit of 25 per cent of the savings under the bogey cost, the total profits per engine would amount to \$1,075 on the basis of an actual average cost of \$3,200 per engine, or to \$1,125 on the basis of an actual average cost of \$3,000 an engine. It will thus be seen that the change from the cost-plus contracts to the fixed-price contracts saves the Government from about \$75 to \$125 (or possibly a little more) per engine, on the fixed-profit allowance, and also whatever expense may be saved by the reduced requirements of cost supervision and accounting and in connection with material. Upon the new fixed-price contracts the contractor's profits, though reduced, still remain very liberal.

It is understood that it has been arranged that similar revised contracts on a fixed-price basis will be made with the Ford Motor Co. and the General Motors Co., but these had not yet been executed according to the latest information received.

The Contract for Emergency Work has been charge with reducing efficiency and incentive through the general knowledge had by labor that the work was being done for the Government on a cost-plus basis. It is difficult to appraise the effect of this factor, which was offset to some extent by a realization of the urgency of the war needs. The average output per man hour during the war period was usually below the prewar normal. This applies to both construction and production work, irrespective of whether it was public or private work or was done on a lump-sum, unit-price, or cost-plus form of contract. The most serious features met were the independence induced by shortage of labor; overtime payments which caused some to lay off and others to slack off and so necessitated still more overtime; and overtime work which, by depleting energy, tended to reduce the average hourly output and, under some conditions, the daily or weekly output per man. Such output is much less dependent upon the form of contract adopted than upon quality of management and supervision used. These are usually stimulated by a lump-sum or unit-price contract under which the contractor loses if his management is inefficient. The Government had to decide the vital

question as to whether it could make such stimulus effective at a price it could afford to pay. This price had to be measured in its loss of control of its work, loss of time needed to prepare definite plans and specifications for competitive bids, and loss of the additional profit asked by a contractor for his assumption of contingencies and risks. In the war emergency construction these losses were prohibitive. This was especially true of loss of time which meant great loss of lives and money by the prolongation of the war. For these reasons the contract had to provide that full control of speed, quality, and cost remain with the Government. This was almost as necessary in the work of the United States civilian industrial army as in that of the overseas enlisted forces. Both had to be mobilized and carried on the pay roll and had to be used on a cost-plus basis of work. The problem became one of getting the maximum output from this home army of civilian workmen. Control of cost was largely lost by the contractor and assumed by the Government. Even the item of labor cost per unit of output became secondary. This was due to the enormous overhead cost of the war. In every business undertaking the total cost is made up of material, labor, and overhead. There was little likelihood of paying more than speed was worth on essential war construction under the Contract for Emergency Work considering that the total overhead or money cost of the war to the United States, apart from its cost in lives, averaged about \$30,000,000 daily. The total daily labor cost of War Department construction in this country was less than 5 per cent of this amount. The obvious and vital question was how to get speed and not the labor cost thereof. Some 200,000 workmen were required on War Department construction in the United States to meet the needs of 2,000,000 overseas troops and provide the plant and other facilities required for their supply and for the training of additional troops. It was soon found that these problems of troop supply and training were of primary importance and everything was subordinated on construction and production to increasing output.

The Contract for Emergency Work left the Government free to use its own discretion in the above-mentioned matters and to order such overtime, at its expense, as conditions seemed to call for. Overtime did not mean waste or extravagance unless it failed to increase the man-day output on this war work. It did mean waste when it was allowed merely to secure men for the direction of whose work efficient foremen were not obtainable, or when men went stale and the man-day or man-week output decreased due to excessive, continued overtime. The first-named condition seems to have occurred more often than the last, although evidences of both were observed.

The Board of Review has made special inquiry of many contractors, constructing and administrative officers, field auditors, advisory and

supervising engineers, and other competent judges respecting the methods and procedure used and results secured on construction done under the Contract for Emergency Work. The following statement summarizes the more important opinions so obtained.

1. The contract permitted starting work promptly and pushing it rapidly. This prevented loss of time which meant loss of money and lives and possibly of the war. The speed attained under the contract was responsible for getting troops to France in time to turn the tide which many believed had to be turned in 1918 if at all.

2. The contract could be used without change, irrespective of the size or character of the project.

3. Delay was not necessarily entailed by the frequent lack of definiteness as to general requirements or as to total structures and facilities to be provided.

4. Work could be shut down or rushed to completion at the discretion of the Government.

5. Prices of materials and labor and the quality of work could be fixed and controlled by the Government and disputes were avoided as to these and were largely eliminated as to overhead costs and extras.

6. The contract was unaffected by wide variations constantly occurring in the available supplies of material and labor.

7. Loss of time through the creation of new construction organizations was avoided by the selection and utilization of such existing contracting concerns as were best qualified to execute work.

8. The contractors; subcontractors, superintendents, engineers, and Government representatives on the various projects were all working with a common interest and to the same end—to finish the work in the least time and at the lowest practicable cost under the conditions prevailing.

The board concurs in the foregoing opinions and conclusions.

The schedule of fees provided in the standard contract seems, in the opinion of practically all who were interviewed, to be generally considered as adequate and fair to all parties. The Board of Review shares this view and, had the war continued, would have suggested no material changes therein. The board has also considered the question as to whether contractors should be selected according to their willingness to do the work for less than these fees. Many such contractors could have been found. The board is convinced that such a plan, if adopted, would have proved disastrous to the execution of the war program and that an effort to save on the fee of a competent contractor by selecting another because of his willingness to work for a smaller fee would have been as false economy as to attempt to hire legal, medical, or other professional service on such

a basis. Savings in fees so effected would have been wasted several times over in other ways and would also have entailed fatal delays.

The board finds that the standard contract secured maximum speed, coupled with proper quality, at a less relative cost than could have been done by any other method available and that it operated with smoothness and flexibility and prevented delays from misunderstanding and friction between the Government and its many contractors. As a rule its critics do not seem to have grasped the underlying facts and conditions nor always to have understood the nature of the contract and the reasons for its adoption. No form of war emergency construction contract could eliminate waste, extravagance, or inefficiency which, under war conditions, could only be minimized through the use of experienced Government representatives on the work of administration and supervision, and competent contractors on the work of execution.

The board finds that the use of this form of contract, as finally developed, was well justified and contributed to the success of the emergency construction program, that by its use speed was attained in war construction projects, and that it is probable that such work could not have been performed in the time available without it or its equivalent.

The board finds that the cost plus with sliding scale and fixed maximum fee contract can not be judged alone by the cost of work done thereunder as it was designed primarily to, and did, secure speed; that unit labor costs thereunder were high, as in all war work, but that the causes did not lie in the contract itself, but rather in the conditions surrounding its application, which were principally high wage scales, overtime, use of any labor obtainable to push work, inefficiency from floating labor, labor shortage, lack of experienced foremen and superintendents, and poor management by some contractors.

The Board of Review is, however, of the opinion that, in the matter of fees, the standard contract could have been simplified by the use of a block system of fees based on the payment of a fixed amount for the first block of the cost and of suitable additional amounts for each additional block, and that under such a block system of fees a concern proven satisfactory on emergency construction could probably have been kept at work continuously throughout the war period for a lesser total fee than by subdividing the same work among several contracts executed with him or others.

The board is also of the opinion that Government interests would have been helped in some cases by the insertion of a clause in the standard contract requiring that the duly appointed representative of the general contractor or subcontractor who, under the contract,

was to be kept at the site, be one of the chief executives of the corporation or a member of the firm. Much work had to proceed on general plans while details were being developed and this involved decisions respecting locations, roads, transportation, handling of materials, etc., which required that the contractor's resident executive be a man of large caliber. The insertion of the provision mentioned would have enabled the Government to compel a negligent contractor to give the work the needed quality of supervision. In some instances the contractor tendered his organization and invited the constructing officer to use it. This attitude threw responsibility and duties upon the latter which the contractor alone should have carried. With a competent principal of the contractor on the ground the foremen would have received better information and instructions respecting objectives and methods and time and money would have been saved. These statements do not apply in the majority of cases, as most of the contractors kept an experienced principal almost continuously on the work.

The Committee on Emergency Construction also prepared forms of contract for the employment of supervising engineers, town planners, and other experts. It was assisted in such work by many members of the different national engineering societies. Effort was made to obtain the most competent engineers available for this work, preference being given to those having local knowledge. In this way the services of men specially skilled for a particular problem were obtained and the most effective project organization was built up. Information respecting forms of contract used and fees paid is given in a subsequent section.

Contracts for construction work for the War Department were also made by other of its bureaus than the Cantonment and Construction Divisions. These contracts were of great number and differed in varying degree as to character, form, substance, and fees from the standard contract as used on all projects built by such divisions. In many cases, especially where a manufacturer received a supply contract that was desirable because of the opportunity it afforded to obtain plant extensions to which the title could be acquired on advantageous terms after the war, or because of other reasons, the construction was done at cost plus a fee of \$1. In other like cases the fee was larger. The fee expressed in percentage was usually greatest in cases where a supply or operating contract did not accompany the construction contract.

The Board of Review has studied many of these contracts, but has found it impossible to treat them as a whole. Review thereof would require their separation into classes or groups comprising one or more contracts and a study of the conditions surrounding each group. This it was impossible to do with the time and organization available, and,

therefore, no attempt is made to deal with them at length in this report, although considerable data thereon is hereinafter given.

The board does not understand why the Navy Department, after participating with the General Munitions Board in the preparation of the Contract for Emergency Work, and the Ordnance Department, did not adopt and use this general form of contract on their construction. Information available to the board leads it to believe that if they had done so many millions of dollars would have been saved to the Government. The general use by the Navy bureaus and Ordnance Department of such a standard printed form of construction contract, coupled with knowledge as to its authors and the work done by them in determining proper fees and working relations, would have gone far in establishing its presumptive fairness in the minds of prospective contractors. Such use would have saved an incalculable amount of valuable time lost in negotiations over fees and terms. It appears that few of the contractors under these departments took work at fees that were less than fair while many demanded and received much more. The general adoption by the Government of a fair and reasonable standard scale of construction fees would have made it difficult for the latter class to obtain excessive fees by tiring out Government representatives who were working under high pressure. By "excessive" is meant fees materially exceeding in amount or percentage those fixed by the General Munitions Board after thorough investigation for like construction under its standard contract and found to be acceptable to contractors and effective in securing speed. Something might be said in favor of larger fees if there were any evidence that they produced greater speed. Otherwise their allowance or exaction was apparently unnecessary and unfair to the Government and to the other contractors working at lower fees.

If Government officials generally had been instructed to use, on construction, some such type of fair standard contract, as recommended by the interdepartmental conference already mentioned, it is apparent that by publicity alone, they could have compelled many concerns doing work essential to the Government war program and demanding large fees therefor to have accepted substantial reductions from such fees. Moreover, their work could have been started much earlier, because the time and energies of all concerned would not have been dissipated in avoidable preliminary negotiations.

The Signal Corps adopted the standard Contract for Emergency Work, modified in certain details, for numerous construction contracts planned by it early in the war.

Some of the other bureaus of the War Department are stated to have used for their construction work a form of contract modeled in part on this standard contract. Its availability for the use of other

departments of the Government appears to have been helpful to some of them in drafting contracts and in negotiating fees and profits to be paid to contractors.

Almost any form of cost-plus contract, whether in peace or war, is better suited to construction than to factory or multiple production work. Piecework, or some other plan inducing economy through increased output, is usually to be preferred for the latter.

Some prejudice has arisen against the cost-plus form of construction contract because of observations made on such work during the war when, in many cases, labor conditions in the building industry were abnormal. These conditions would, however, have existed in most instances had the work been done on any other basis. Many Government projects were built away from labor markets and it was necessary to hire men in the large cities and send them to these points, where they were usually housed in barracks or worse. The rates of wages established by the Government and made obligatory on these contracts were lower in some cases than the wages paid in the labor markets in which men were recruited and, as more work was available in the large cities than the supply of competent mechanics and good laborers living in such cities could handle, there was little incentive for a good man to leave his home. The result was that these projects had to be built with considerable so-called floating labor, much of which was not physically fit to do a good day's work. For these reasons opinions formed as to the relative advantages of cost-plus or lump-sum work based on war-time experience are apt to be misleading. Moreover, in such comparisons the efficiency of work on cost-plus contracts during the war is usually contrasted with that on lump-sum work carried on before the war, or on one of the comparatively few lump-sum contracts done during the war on which the contractor was not subject to the Government wage scale and, therefore, could pick his men by paying wages above that scale.

The majority of the criticisms made of Government cost-plus contracts seem to relate to production work and to cases where the contract permitted charging a portion of the contractor's overheads to cost, or permitted charging items to cost which were properly chargeable to other work being done at the same time or place. Under such conditions—neither of which applied to War Department construction work done under the standard form of Contract for Emergency Work—the task of the Government accountant was difficult and complicated. He had to determine whether the accounting system used was correct and adequate; the materials purchased or taken from stock were charged at the right figures and actually used or credited if not used; the labor was charged at correct rates and actually used; the administration and overhead charges were fair; the charges for depreciation and interest were justified; the methods of allocating

the foregoing charges were proper; and, finally, whether the entire procedure conformed to law and the rules of the Treasury Department. The Government accountant had often to determine the cost of manufacturing a given unit. This he could do only after thorough investigation and scrutiny of all charges made or proposed to be made. Important differences of opinion developed because factors depending on judgment, experience, and custom entered into such determinations. These differences often resembled those between a buyer and a seller in which both can cite good reasons to support their contentions. The manufacturer usually had unlimited time, talent and data to support his arguments and a personal interest in the outcome, while the Government representative was seldom well equipped to develop and present its case properly. Under the stress of War the Government frequently could not afford the time to thrash these matters out and its interests suffered in consequence.

Questions of the above-described character arose principally in connection with cost-plus contracts placed by the Government with Private concerns for work in which the Government either did not have or did not exercise full control of the charges made against cost.

While the board has, in its review, dealt principally with construction matters, it has also acquired considerable information as to the methods and procedure employed on production contracts and the results thereunder. It believes that, by a corresponding standardization of fees and production contracts large sums would have been saved to the Government.

The Board of Review has condensed some of the views and conclusions expressed in this section into the following suggestions for improvements:

Have all Government agencies use types of standard construction contracts so far as possible.

Adopt the standard form of Contract for Emergency Work when conditions make it advisable that Government construction be done on a cost-plus basis, as this form of cost-plus contract created by the General Munitions Board and used by the Construction Division of the Army was of great value in the accomplishment of the war emergency work.

Create by a qualified board or committee corresponding standard forms of lump sum and unit price construction contracts for ordinary peace time use.

Prohibit the use of a multiplicity of construction contract forms varying widely and unnecessarily in type, form, and compensation of which many instances may be found among Ordnance contracts.

By adopting contract standards, such as those above mentioned, the Government will be better protected and will save time and money and the contractors will receive fair and uniform treatment and the

amount which the Government has to pay for its construction will not depend upon the experience of its Government representative who is charged with the negotiation or be controlled by patents or by the special trade or professional knowledge of the contractor. Any compensation properly due him for these features should be specific and not be used as a basis of bargaining as to the fee to be paid for the construction of the needed plant facilities.

SECTION 5.

SELECTION AND WORK OF CONTRACTORS, CONSTRUCTING QUARTERMASTERS, SUPERVISING ENGINEERS, AND FIELD AUDITORS ON WAR DEPARTMENT CONSTRUCTION PERFORMED UNDER THE STANDARD CONTRACT FOR EMERGENCY WORK.

CONTRACTORS.

The General Munitions Board, later the War Industries Board, early recognized that the selection of a contractor for essential war construction should not depend upon general or individual impressions or offhand conclusions as to his qualifications. The interests of the Government as well as fairness to all localities and contractors required that measures be adopted to ensure that all qualified concerns in the country desirous of participating in such construction be given consideration. The board therefore ordered a thorough canvass of the building industries to be made before the cantonment or other construction work was started.

A questionnaire was issued to leading architects and engineers and to the executives of large corporations by the board's subcommittee on emergency construction. This was intended to obtain all important information concerning qualified contractors of their acquaintance. As a result the Government was soon in possession of fairly reliable and up-to-date information concerning more than 1,400 contractors throughout the country.

The committee on emergency construction later sent out questionnaires to these contracting firms asking references, data as to the magnitude and kinds of work executed by them during the two preceding years, the number of men employed and fed at one time, and their financial resources. It also obtained their financial and credit ratings from financial agencies and banks. This information enabled the War Industries Board to supply the Government with the essential facts respecting contractors under consideration, based on their own representations and on statements made by the architects, engineers and owners with whom they had dealt. Additional like information was subsequently accumulated until the files of the committee contained data of this character concerning about 3,500 contractors.

The committee states that it recommended only those contractors which it thought best qualified to undertake the work, and whenever possible, selected those who had demonstrated their ability to handle like work of importance. It states that selections were made on the requirements of each case as they were understood, without regard to political influence and on the basis of the contractor having proper experience, organization, and equipment, being financially responsible and having no other contracts likely to interfere with his efficient handling of the work. The evidence and recommendations were submitted to the Chief of the Construction Division and, if he concurred in the latter, were forwarded to the Assistant Secretary of War for approval. The results obtained indicate that the procedure employed was probably as effective and satisfactory as any that could have been adopted.

The contractor was expected to use the methods with which his organization was familiar in employing labor, keeping time, making payments, and all other operations incident to construction, modified as necessary to meet Government requirements.

It was often thought to be for the Government's interests to keep together and transfer to new work the organizations of a contractor and a Government constructing officer when they had proved their ability to work together harmoniously and effectively and to obtain satisfactory results. In some instances months were saved in getting work under way by shifting seasoned contractors and constructing quartermasters, with their organizations, from one project to another. This action, however, raised some question as to whether certain contractors were given undue preference in placing work. The answer made, that it was necessary to keep the most efficient and experienced contractors continuously employed, is a satisfactory one. The volume and importance of the emergency work demanded the subordination of all other considerations to that of securing the most effective service and the interests of the Government were more important than a wide distribution of construction contracts. The best distribution of work came next and the claims of individual contractors last. The percentage of contractors receiving two or more contracts was small. Everything considered, the work seems to have been as intelligently and fairly distributed as conditions permitted.

Both the contractor and the Government had to have more elaborate and expensive administrative organizations than on Government or private lump sum or unit price contracts, or on private work done on a cost-plus type of contract. This was due to the need for a thorough checking of all costs and for using accounting methods conforming to Government requirements and satisfactory to the Treasury Department. The contractors who recognized that

many accounting details which are commonly considered trivial are of primary importance on cost-plus Government contracts had the least trouble and delays in their financial dealings with the Government.

The contractors and the Government representatives cooperated in planning methods, creating designs, selecting plant, developing time schedules, and making cost estimates and reports. While the work was being started general charts were made showing organizations and relationships, contemplated progress schedules and plant layouts and the requisite facilities for transportation, roads and railroads. Studies were made of the routing of materials, sequence of operations, handling of materials and allocation of men, machines, teams, and plant needed to obtain maximum output at minimum cost. Detailed designs of structures and accessories and bills of material for placing orders were also prepared. Methods which varied according to the work were devised to stimulate labor to greater effort. These supplemented the stimulus applied through patriotic drives and propaganda. As soon as practicable such efforts were made as were consistent with rapid prosecution of work to obtain comparative cost data figures. It was found that unit cost figures compiled promptly for the guidance and immediate use of the contractor and constructing quartermaster were most valuable in the daily and weekly checking of labor efficiency and costs. The most desirable contractors were those who could deliver the best results per dollar expended, considering speed, quality, and cost.

It was important, in the interests of the work, that contractors who lived up to their agreements should receive their contract fees. They could not be expected to stand losses of money or credit caused by having to advance excessive amounts of working capital in cash or specially purchased construction plant. As the standard form of contract used was designed to meet these conditions but few justified complaints developed from these causes.

The fee of a contractor could not be increased and was subject to an automatic reduction if changes or cancellations brought the actual cost below the original cost estimate on which such fee was based. This feature of the standard contract protected the Government against losses from avoidable overruns or extras, as they yielded no additional profit to the contractor who had every inducement to earn his fee by finishing the project as promptly as possible so he could go after other contracts.

It was expected that the general contractor would select subcontractors and submit their names, with an alternate or second choice, for approval to the constructing quartermaster who would, when necessary, refer the names to the supervising constructing quartermaster at Washington. It was the general policy to use subcon-

tractors in all cases where such employment would serve the interests of the Government—usually for plumbing, heating, electrical, sheet metal, road, and other specialized work. This was subject to modification according to local conditions. When such work was subcontracted on a cost-plus basis, the standard form of contract was used, the subcontractor's fee being based on the authorization estimate or on the best estimate of the cost of such work available at the time of the letting. It was, however, the policy to require the general contractor to make his purchases from subcontractors on a competitive or lump sum basis whenever possible, as, for instance, in a case where the work consisted of the field installation of manufactured articles or factory products, the prices of many of which were fixed by Government agencies or representatives.

Some criticism of the standard Contract for Emergency Work has arisen because it provides for the payment of a fee to the general contractor for acting as a broker and letting work to a subcontractor. In the first two editions of this contract the general contractor was allowed a fee of 5 per cent on the cost of work done by subcontractors. In the last two editions this was cut to $2\frac{1}{2}$ per cent, which is probably as small a fee as it is expedient to fix, for if the fee is too small the general contractor is influenced to attempt the performance of specialized work for which he is often neither experienced nor equipped.

CONSTRUCTING QUARTERMASTERS.

Each War Department emergency construction project built by the Cantonment Division or the Construction Division was supervised by a resident constructing quartermaster who was usually recruited from civilian construction work. He was officially designated to represent the contracting officer who, in most cases, was the Chief of the Construction Division. He was furnished with a standard manual of instructions for his guidance and given wide discretionary powers and full authority. The position demanded good executive experience, knowledge of field construction, and ability to make correct decisions promptly and push work intelligently. Prior familiarity with the type of project and the sort of business management which its execution would call for were important qualifications of constructing quartermasters.

The constructing quartermaster was in general charge of a project. The contractor, the supervising engineer, and, except in the case of the cantonment work, the field auditor reported to him. He was responsible for getting satisfactory results and for the proper administration of the work. He could increase, decrease, or alter the work, but could not increase the contractor's fee. This arrangement minimized the likelihood of collusion between a constructing

quartermaster and a contractor, as the former was not in a position to help the latter to make additional profits in which he might share.

The smallness of the losses reported as chargeable to the dishonesty of constructing quartermasters may be attributed to this feature of the standard contract or to patriotism, honesty, or the severity of military punishment for such offenses. Special inquiry was made of the Chief of the Contracts Division as to the number and extent of defalcations. He states that only one such case had developed and that it involved a loss of less than \$1,000, i. e., less than one ten-thousandth of 1 per cent of the total expenditures made by the Construction Division. In this instance the division asked the court to impose the maximum penalty of 20 years' imprisonment, which was done.

It is evident that the constructing quartermasters were vigilant in caring for the Government's interests. With their superiors, they so effectively discouraged development of tendencies toward graft and dishonesty that the Chief of the Contracts Division stated that the losses from dishonest practices of any kind on all the work done by the Construction Division was but a small fraction of the average percentage of loss from like causes on ordinary private contracts and construction work. He also stated that during his two years' service no instance had come to his attention where any contractor, material man, or other party had made any suggestion respecting the payment of commissions or the giving of other inducements in return for work or special favors.

The constructing quartermaster passed upon prices and orders for materials, the purchase or rental of equipment, the retention or discharge of any unit of the contractor's organizations and his performance of the field work. This general plan accords with methods gaining favor in large business and industrial concerns. The tendency there also is toward the decentralizing of authority and the making of individual operations as nearly self-functioning as possible, centering local authority in one competent person and making him responsible for securing the best results.

In order to obtain the maximum speed, quantity, and quality of work for the money and labor expended, effective teamwork by the Washington office, the field officer, and the contractor was necessary. The fullest cooperation and coordination by all parties was encouraged by endeavoring to establish and maintain cordial working relations. The administrative organization of the project reported through its constructing quartermaster who, with several other constructing quartermasters reported to a supervising constructing quartermaster, who had his headquarters at Washington and frequently visited the work. A section chief located in the Washington office was in charge of about six supervising constructing quarter-

masters and, with other section chiefs, reported to the chief of the building division of the Construction Division.

The constructing quartermaster made requisitions on his supervising constructing quartermaster for such principal material as he was required to order through the Washington office and later approved the orders issued therefor by the contractor. He also filed periodical, usually weekly, progress reports and charts, the form of which, as well as of the cost and labor reports, was gradually standardized by the Washington office. The supervising constructing quartermaster acted in two capacities, as he represented the interests of the constructing quartermaster in Washington and also the Washington office in the inspections which he frequently made of the field work. Cooperation between the supervising and the constructing quartermaster was essential to success. Investigation by the Board of Review in Washington and in the field showed that these supervisors gave proper support to their constructing officers and were diligent in watching the progress and cost reports.

SUPERVISING ENGINEERS.

The constructing quartermaster made a contract for the services of an engineer or firm of engineers, selected or approved by the Washington office to act as supervising engineers. A standard form of engineering contract was used for this purpose. The engineer or engineering firms selected was familiar with local conditions and with the special class of work called for. This engineer or engineering firm elaborated and adapted to suit local conditions the standards laid down by the engineering division of the Construction Division and, when time permitted, went to Washington for a conference before entering upon his duties. In this way the supervising engineer relieved the engineering division at Washington of the difficult and almost impossible task of furnishing detailed plans and specifications to suit conditions at each site. His work varied in character and scope on each project and depended more or less upon the methods and personality of the constructing quartermaster as well as the needs of the general contractor. The supervising engineer supplied to the field organization advice and assistance somewhat similar to that which the Washington staff of advisory experts furnished to the central office.

FIELD AUDITORS.

The services of a field auditor and his organization for handling the checking, accounting, and auditing on a project, except for the 16 cantonments, were contracted for by the constructing quartermaster. Most of the auditing difficulties on the cantonments are traceable to the failure, for reasons hereinafter stated, to put these

auditing forces fully under the constructing quartermasters. The field auditor was frequently recommended to him by the accounting division of the Construction Division. Each field auditor was furnished with a standard manual of instructions for his guidance.

The field auditor at each project generally had charge of all auditing and clerical work, shipments received, car demurrage, the unloading and release of cars, the Government materials inspectors, and the checkers of pay rolls and wage payments. He also handled accounting matters relating to Government rentals and purchases of contractor's equipment.

SECTION 6.

THE CANTONMENT DIVISION AND THE CONSTRUCTION DIVISION OF THE ARMY.

The Cantonment Division was created from the construction and repair division of the office of the Quartermaster General by an order of May 16, 1917. To it was assigned the construction of the cantonments and camps required for the housing of troops to be called under the selective draft law passed May 16, 1917. Its chief was given special authority by The Adjutant General of the Army to report directly to the Secretary of War, to communicate directly with the department and division commanders by order of the Secretary of War, and to issue instructions to civilians and officers for all travel connected with the work.

On October 5, 1917, the Secretary of War directed that all war emergency building and construction in the United States provided for by existing or pending appropriations be executed by the Cantonment Division.

On February 9, 1918, the Cantonment Division became a part of the office of the Chief of Staff, reporting to the director of operations.

The Construction Division of the Army, which succeeded to the special authority above mentioned, was created from the Cantonment Division, by authority of the General Staff, by an order, dated March 13, 1918, which separated the Cantonment Division from the office of the Quartermaster General and made it the Construction Division of the Army, with instructions to report to the Assistant Chief of Staff in charge of operations. This order was issued under authority granted in act of Congress approved May 18, 1917, "To authorize the President to increase temporarily the military establishment of the United States." It permitted the Construction Division to be temporarily increased during the war emergency so as to consist of a total of 1,407 commissioned officers.

There was also authorized a maximum civilian personnel of 1,138 to be employed by the Construction Division and to be taken on and

laid off as needed in accordance with the requirements of the work in progress or in immediate prospect.

On April 10, 1918, it was ordered that all plans, specifications and estimates for War Department construction work be prepared by or under the supervision of the Construction Division upon general requirements given in advance by the bureau involved, and further, that all engineering services and services of contractors in connection therewith be obtained by the Construction Division.

War Department General Order No. 80 of August 26, 1918, in setting forth the duties, relationships and policies of the several corps, bureaus, and other agencies of the military establishment, states:

The officer in charge of the Construction Division who shall be designated as the Chief of the Construction Division shall communicate directly with the director of operations in all matters with which the latter is charged which require the action of the Chief of Staff.

When war was declared on April 6, 1917, there was no construction bureau of the War Department competent to design and handle the necessary emergency construction work. The nucleus of such an organization was created by assigning to the office of the newly formed Cantonment Division three Regular Army officers, Col. I. W. Littell, Capt. W. H. Oury, and Capt. R. C. Marshall, Jr. The requisite additional commissioned personnel were, with few exceptions, drawn from the ranks of civilian engineers, architects and constructors, selection being based, so far as possible, on ability, experience and special fitness for the work.

When the armistice was declared on November 11, 1918, the Regular Army officers on the staff of the Construction Division were Brig. Gen. R. C. Marshall, Jr., Col. C. D. Hartman, and Maj. A. H. Erck. At that time the authorized strength of the commissioned personnel of the Construction Division was 1,875. The actual strength was 1,429 in addition to 12,965 enlisted men, including those in the Washington headquarters office and those in the maintenance and repair division engaged in the operation of utilities. There were also employed 12,353 civilians and 203,930 workmen.

Shortly after the declaration of war the need for experienced constructors for the Cantonment Division became so great that, as the then allowed quota of the Quartermaster Corps for such work was filled, it was necessary to call into its active service many men already commissioned in other branches of the War Department. Later, still more civilians were given commissions in other bureaus, including the Engineer Corps and the Ordnance Department, and were assigned to work with the Cantonment Division. The majority of these men were subsequently commissioned in the Quartermaster Corps.

As thus constituted the Construction Division, although separated from the Quartermaster Corps, had a personnel which was principally of such corps and lacked the independent status necessary to enable it to adopt some distinguishing corps insignia by which its individuality in Government circles and in the mind of the public would have been established.

The construction work of the War Department in the United States was done by civilian contractors, workmen and supervising engineers under the direction and supervision of the commissioned personnel of the Cantonment and the Construction Divisions, while its construction work overseas was allotted to the Engineer Corps and done principally by troop labor.

On May 27, 1918, the Chief of Engineers addressed a memorandum to the Chief of Staff recommending "that the Construction Department be transferred bodily with its present organization to the Engineer Department and placed under the control of the Chief of Engineers."

On June 10, 1918, the Acting Quartermaster General stated that the Quartermaster General had no authority over or responsibility for the Construction Division and that he would like to see its status settled so that an entire separation could be made from the Quartermaster Corps and recommended that this branch, in time of war as well as in time of peace, should be under the control of the Engineer Corps.

On June 14, 1918, the Secretary of War disapproved the recommendation of transfer of the Construction Division to the Engineer Corps.

The Board of Review has read and considered the above-mentioned and related communications and the reasons given for and against the changes proposed and finds that the Secretary of War acted wisely in disapproving the recommended transfer of the Construction Division to the Engineer Corps under war conditions and is further of the opinion that the transfer should not be made under peace conditions and that the Construction Division should be entirely separated from the Quartermaster Corps.

As outlined in the foregoing paragraphs, the Construction Division is a product of the war. It is charged with all construction work for the training and supply of the Army in this country, in the Hawaiian Islands, the Philippine Islands, Alaska, Porto Rico, and the Canal Zone, and with the maintenance and operation of all military camps and permanent posts and the utilities serving them. It directed the construction required, including cantonments and camps in the areas stated, for the accommodation of the Army called into being under the selective-service act and the federalization of the National Guard. The emergency requirements for Army construction which it was called upon to supply corresponded sufficiently to those found by the Government to be needed for additional marine

transportation facilities to warrant the following comparative statement of the respective methods and procedure adopted in attempting to deal with the two problems.

The Cantonment Division was charged with the execution of the work of building the cantonments and camps for housing the troops after a study of the problems involved had been made by the General Munitions Board of the Council of National Defense in the spring of 1917. The doing of this work under a Federal corporation, controlled by the United States, was considered and abandoned and decision reached to have it performed under the control of the Army.

The United States Shipping Board was created by Congress in 1916, with the power, in its judgment, to organize one or more corporations to carry out the purposes of the creating act, and it formed the Emergency Fleet Corporation, which was charged with the construction of ships and yards, and is, in effect, the construction division of the United States Shipping Board.

In each of these two cases the construction body was originally expected to act principally as an organization for the designing and construction of certain work then contemplated, and, in each instance, such duties were soon enlarged because of imperative demands for additional construction. Thereupon the Emergency Fleet Corporation created its division of construction, and the Secretary of War, as previously stated, placed all War Department construction under the Cantonment Division—later the Construction Division of the Army. Both found that Government control and assistance of contractors would be essential in order to provide them with needed materials and labor.

The Emergency Fleet Corporation later separated its division of construction in two parts, the divisions of wood and of steel ship construction.

The Construction Division of the Army later separated its central or Washington organization into seven administrative and supervisory divisions, one of which, the building division, was split into the six sections below listed, which directed all field construction as indicated:

Section A—Southern camps and quartermaster shops.

Section B—Northern camps and general hospitals.

Section C—Storage and terminals.

Section D—Ordnance depots, manufacturing and proving plants.

Section E—Signal Corps, Aeronautics, housing and unclassified.

Section F—Army posts, exclusive of large hospitals.

The section chiefs of the building division could call for assistance upon the members of the group of advisory engineers of the Construction Division, approximately 12 in number, each of whom was an expert in one or more lines of engineering. These chiefs issued

their instructions to the field through supervising constructing quartermasters, who also had their headquarters in the Washington office of the Construction Division and directed the field constructing quartermasters, one of whom was placed in charge of each construction project, had full authority for its administration and for the disbursement of funds, and was responsible for the active and proper execution of the work by the contractor.

Generally similar problems of procurement, transportation, wages, housing, morale, etc., were met in both cases. The Construction Division had a personnel especially chosen for experience in its work. The Emergency Fleet Corporation had no corresponding reservoir of experts to draw upon. Its director general has stated that the newly created ship-building industry was deficient in men having experience coupled with proper temperament, in competent contractors and workmen, in plant, yards, and other facilities, and that it had to adapt its methods to the mental capacity and peculiarities of the limited number of men available. This may account for some of the difficulties it experienced.

The first construction work undertaken for the Army by the Cantonment Division was the building of the cantonments and camps. This was accomplished within the allotted time by adopting a policy of thorough decentralization of control. Later a tendency developed to centralize much work in Washington, but the results were unsatisfactory, and both the Construction Division and the Emergency Fleet Corporation found that decentralization was essential in order to secure speed. The former thereupon again vested full authority and responsibility directly in its constructing quartermaster on each project and backed up his decisions and actions, but maintained close touch and cooperation through its supervising constructing quartermasters, who acted as the headquarters representatives or liaison officer of the field forces, while the latter appointed regional executives, known as district managers. The plan adopted by the Construction Division was found to avoid the troubles and delays which had developed under centralization and also those which its executives state were believed by them to be inseparable from any plan by which work was attempted to be handled through regional offices remote from headquarters. The character of some of the prevailing conditions are indicated in the following extract from a public statement made in January, 1919, by the Director General of the Emergency Fleet Corporation:

Similar decentralization and coordination of all the war-making and war-serving departments of the Government could have been effected if the same geographical districts had been adopted for all these departments, and if a representative of the President had been appointed in each district as the coordinating officer of the district heads of these departments, with the power to review and veto on any question

affecting two or more departments. The pyramiding of wages, the placing of contracts beyond the producing capacity of the district, the duplication of facilities could largely have been in this wise avoided, for most of these difficulties arose out of the wholly unregulated activities of the several large governmental departments.

The control exercised in these respects by the War Industries Board, beneficial and helpful as it was, did not extend far enough, nor was that board created early enough to prevent some of the more flagrant of the difficulties which impeded the industrial processes serving the war. Had the war continued another year the necessities would inevitably have led to an organization controlling and coordinating all district activities of the several Government agencies and departments, thereby making them immediately responsive to such a national directing agency of industrial processes and needs as the War Industries Board finally became. There would have developed out of such an organization a national labor policy consistent in its aims with the industrial needs of the country and avoiding the needless and expensive competition for the limited labor supply by contractors having cost-plus or remunerative lump-sum contracts. There would have been provided opportunities of disciplining recalcitrant contractors who offended both the canons of decency and the implied obligations of contract.

The War Industries Board had full control of the allocation of materials and commodities. It endeavored to effect a proper distribution of industrial effort suited to the Government's needs as they developed from time to time. Through the United States Railroad Administration it arranged shipment schedules in order to minimize transportation delays. If attempt had been made to fill the normal needs of private industry the prompt furnishing of supplies imperatively needed for the Army would have been prevented. Hence the board stopped much nonwar construction in an effort to overcome railroad congestion and the exhaustion of war essentials. The urgent requirements for overseas were also responsible for the enforced cessation by the board of private building activities throughout the country by the requisitioning by Government bureaus of such building materials as were produced. The War Industries Board also handled priorities and endeavored to supply each of the major arms of the Government with its materials requirements without interfering with the needs of private industry more than it deemed necessary.

The following list gives the names and primary special functions during the War of the principal bureaus of the War Department. The Construction Division was charged with the construction works other than that in Europe, required by these bureaus and with the operation of utilities connected therewith.

1. Engineer Corps—engineering problems of combat troops and supply of material and equipment for overseas field construction.
2. Motor Transport Corps—supply and operation of motor vehicles and accessories.
3. Medical Corps—bodily health of troops.
4. Tank Corps—supply and operation of tanks and accessories.

5. Chemical Warfare Service—supply of materials and equipment for gas warfare and training of gas offensive combat troops.

6. Ordnance Department—supply, distribution, and maintenance of guns, artillery, ammunition, and like supplies.

7. Signal Corps—means of military communication.

8. Quartermaster Corps—supply and distribution of subsistence, clothing, and like supplies.

9. Bureau of Aircraft Production—supply of aircraft and of necessary raw products and manufacturing facilities.

10. Bureau of Military Aeronautics—operation and maintenance of military aircraft and training of men for aviation service.

The work of the Cantonment Division began with the design and construction of troop-housing facilities during the summer of 1917. The sites were approved between June 2 and June 27, 1917. It was proposed to call the first contingent of conscripted men to camp during the first week of September. This allowed less than 90 days in which to make surveys and complete general and detailed plans; prepare specifications and contracts; select contractors; organize field forces for the constructing quartermaster, supervising engineer, and field auditor; build and equip at each of the 16 sites a cantonment for housing some 40,000 men and about 10,000 animals; and in addition, to build and equip 16 National Guard camps to house a total of about 460,000, two embarkation camps to house a total of 43,000 men, a quartermasters' training camp to house 18,000 men, and additions to Regular Army barracks to house 100,000 men, making a total housing capacity for over 1,250,000 men. This capacity was subsequently increased to more than 1,600,000 men.

The cantonments and camps were built on tracts of land which were entirely undeveloped for the purposes for which they were to be used. The work on each site had to be complete, with housing, railroad tracks, roads, and all the various utilities. A group of engineering problems of first importance had to be solved; the water supply for each camp studied; proper sewerage provided; and heating, lighting, refrigerating, and laundry facilities furnished. These engineering problems were different for each locality. Under normal conditions the planning alone would take as many weeks as could be allowed for the completion of the entire project. Therefore it was necessary that the designing, detailing, and construction work go forward together.

Aside from the solution of its engineering problems the building of each cantonment was a large operation. It required the use of more than 40,000,000 feet of lumber which, with several thousand carloads of other construction freight, had to be handled in each yard. Many of these sites were served by one track only and it was often necessary to extend and develop inadequate railroad facilities

in order to provide needed capacity for transporting and distributing this freight. Some of the sites were at points remote from labor markets and much labor had to be brought to the work, housed and fed. After the labor had been obtained its development into a construction organization was a large problem.

Viewed as one undertaking costing nearly \$200,000,000, the initial construction of the 32•cantonments and camps was the largest and perhaps the most important single performance of the war construction program. This, however, represented only about one-fifth of the total expenditures and about one-seventh of the total appropriations of the Cantonment and Construction Divisions.

The question has been raised as to whether time or money could have been saved in building the cantonments and camps by adopting some other instrumentality or plan than that used.

As to the instrumentality: It was essential that the Government administer and retain full control of the construction. This necessitated that the work be done by or under a War Department bureau or by a Government-owned corporation of a character corresponding to that used for the shipbuilding work. The need for coupling the work closely with the Army operations justified the selection of a bureau of the War Department as the proper instrumentality.

It then remained to decide which bureau of the War Department should administer and direct the construction work. A group of volunteer civilian experts was, at the time, rapidly developing the cantonment plans. It was desired to give them all possible latitude and to hamper them and the construction work as little as possible by Government or Army restrictions and regulations, experience having shown that such limitations were usually detrimental to speed. The only logical bureaus were:

The Engineer Corps, which had previously directed the technical military work, river and harbor work, etc., and acted as technical advisor to Congress; and

The Quartermaster Corps, which had previously handled this class of Army construction through its construction and repair division and had acquired on the camps of the Regular Army and Coast Artillery a knowledge of their construction, operation, maintenance, and repair requirements.

The Engineer Corps had control over a number of civilian engineers in the Engineer Officers' Reserve Corps and the Quartermaster Corps had similar control over other officers in the Quartermaster Officers' Reserve Corps.

The construction and repair division of the Quartermaster Corps was finally selected to do the work and was designated the Cantonment Division and expanded by the addition of a large number of carefully chosen men.

It is the belief of the Board of Review that the Cantonment Division was better equipped than the Engineer Corps by professional and commercial acquaintance, training and experience to deal quickly and effectively with the contracting, industrial, and labor interests which had to be relied upon to execute this work; also that the use, on the cantonment and camp construction, and on the later construction work of the War Department, of commissioned civilian engineers and constructors rather than the Regular Army organization and the use of other civilian engineers who worked as Government advisors and employees and contractors released for overseas combat service the limited number of Army officers who had military training and allowed the work to be done by the men best qualified to handle it.

A pertinent item on this subject is the following statement from the Engineering News-Record of May 16, 1918, captioned "The reason of construction speed."

One naturally inquires as to the reason for speed—which here is efficiency—in cantonment construction, whereas Ordnance and Aircraft have suffered delay. There are many reasons, but the primary one is that the officers of the Cantonment Division (now called the Construction Division) understood production. The Regular Army officers in charge were open-minded and gave full rein and hearty backing to able construction men from civil life who were accustomed to "putting things through." In the production of Aircraft and Ordnance much of the difficulty has been due to insistence upon getting the very best. The production man will content himself with something less than perfection but will make deliveries on schedule. The production idea must be paramount in such a business as war.

As to the plan: It would have been impossible for the Government to build the cantonments and camps on time by purchasing materials and employing its own labor forces. Results proved that the Government had all and more than it could do to expand its own staff bureaus to meet war demands without simultaneously attempting to create and operate a large number of construction organizations. Never was there greater need of the experience, organizations, resources and acquaintance of seasoned contractors and the elimination of Government red tape than on this work. The total fees paid to contractors on such construction was but a small fraction of one day's cost of the war to the country. Past speed records of peace-time construction work done under Government force account afford small justification for the belief that by such a method the speed realized would have been approached.

The construction work done by or under the Cantonment and Construction Divisions covered the following:

1. National Army and National Guard cantonments and camps.
2. Artillery camps for heavy and field artillery.
3. Border stations.
4. Limited service camps.

5. Embarkation camps for troops and animals.
6. Infantry camps—School of Arms.
7. Permanent posts, formerly known as Regular Army and Coast Artillery, for coast defenses, disciplinary barracks, interior Army recruit depots, remount depots and war prison barracks.
8. Refrigeration and related construction for erection in France.
9. Engineer Corps—camps and schools.
10. Department of Military Aeronautics—constructing bases, camps, depots, flying fields, gas plants, manufacturing plants, schools, shops, testing fields, and warehouses.
11. Ordnance Department—arsenals, bag loading plants, bomb plants, cartridge plants, depots, explosive plants, housing, incendiary products, nitrate plants, picric acid plants, proving grounds, schools, shell loading, shell manufacturing, sulphuric acid, toluol recovery plants, toxic acid, gas and miscellaneous.
12. Chemical Warfare Service—camps, gas plants, and gas-defense plants.
13. Medical Corps—camps, ambulance camps, schools and Veterinary Corps construction, hospitals, comprising base (parts of general training camps), clearing, debarkation, embarkation, general and miscellaneous hospitals.
14. Motor Transport Corps—repair shops and part-storage buildings, crating shops, training camps, garages, etc.
15. Quartermaster Corps—Army supply bases, terminals, camps, depots and warehouses, expeditionary depots, interior storage depots and miscellaneous.
16. Signal Corps—camp, warehouses, depots, and miscellaneous.
17. Tank Corps—camps.
18. Miscellaneous construction, including—barracks, temporary office buildings, in Washington, lighters, roads, water and electric power development.
19. Treasury Department (Public-Health Service)—quarantine stations.

On the above scheduled work the expenditures were in excess of \$1,000,000,000 and comprised 596 construction projects in hundreds of localities scattered throughout the country in every State but Nevada.

Some comparisons made between the work done by the Construction Division and other well-known construction are of sufficient interest to be inserted here.

In New York City there had, by the end of 1918, been put into operation about 280 miles of rapid transit lines on which the city and the operating companies had spent about \$377,000,000, of which the maximum annual expenditure for 1918, was \$48,000,000. The average monthly expenditures of the Construction Division exceeded this maximum yearly expenditure and its total expenditures in 18 months were about three times the total rapid transit expenditures made at intervals over a period of 18 years.

The Panama Canal cost about \$375,000,000, was the largest single project ever built by the Government, required about 10 years for completion, and involved a maximum annual expenditure of about \$50,000,000, as compared with an equal or greater average monthly expenditure by the Construction Division. The initial construction in 1917 of the 32 National Army cantonments and National Guard

camps, considered as one undertaking, totaled in cost about 55 per cent that of the Panama Canal work, and was done in about 5 per cent of the time.

As the Board of Review has elsewhere in this report described and commented upon, in detail, the organization, personnel, duties, methods and procedure of the Construction Division, only a condensed statement thereon is given in the following paragraphs.

The central administrative organization of the Construction Division, located in Washington, supplied supervision, fixed standards and policies and formulated and issued general plans and instructions. As previously stated, the working out of details and the local application of these general instructions were decentralized and largely left to the constructing quartermasters and the contractors, after experience had on the cantonment and camp construction under such plan and also with the plan of centering much detail work at Washington. Any less broad and elastic plan of organization and operation than that used would probably have failed to function and resulted in delay or collapse.

Experience during the first months of the war in emergency work had demonstrated the serious losses in time and money from competition between bureaus for limited amounts of material and labor and the necessity of combining many of the existing construction bodies of the War Department under one bureau, such as the Construction Division, and giving it the power to create and maintain an organization equipped to meet all construction requirements. It was not expected to deal with the production or manufacture of articles at the plant facilities which it built but was expected to handle the maintenance and repair of such structures.

Material was largely mobilized by the materials division of the Construction Division, often through manufacturers and trade committees which were able so to allot orders that conflicts between requisitions were minimized. About three-fourths of all the principal materials required by contractors were obtained through Washington in this manner, and during the summer of 1918, averaged in amount nearly \$1,000,000 daily. The remainder was generally secured by the contractor, at prices approved by the division, from local sources with which he was familiar. The materials division was also organized to push mill and factory production on material and equipment orders. When orders of importance were placed its custom was to have its production expediter at the mill by or before the date of arrival of the order, which he followed up, endeavoring to eliminate factory delays and to effect early shipment. A transportation expediter then took the material in charge and followed it through to destination in order to avoid delays in transit.

The Construction Division obtained much of its material through the War Industries Board with which it cooperated and which in turn placed with it control of priorities for certain materials because of the large quantities of such materials used in its building projects. It also procured building materials for the use of the United States Housing Corporation and the United States Shipping Board.

The purchase of materials and equipment for all corps of the Army was consolidated in August, 1918, when the Construction Division was designated as the procuring bureau for the other bureaus of the Army for all building materials and equipment, such as lumber, nails, hardware, cement, water supply, plumbing and heating systems, electric wiring and equipment, refrigerating plants, etc. At the same time the purchase of all commodities was consolidated and some bureau of the War Department designated as the one procuring agency for each commodity. Certain commodities were controlled by service bureaus and some materials could not be purchased without a clearance certificate issued by the War Industries Board. The only exceptions to these rules were emergency purchases by the contractors from local stocks.

Labor forces engaged on the work of the Construction Division averaged in number, for a considerable period, more than 200,000 and reached 230,000 civilian workmen. Many more would have been used had a supply been available. Union scales of wages and hours of labor were generally adhered to and an open-shop basis was maintained.

Labor-unit costs on this and all other war construction were usually high due to high daily wages or lowered output per man-day, usually both, and because much of this work had to be done by a labor army which, like the fighting forces, often could not be dropped from the pay roll when work let up or was delayed. Consequently, in many cases the total labor costs were largely fixed and more or less independent of output. Strikes were infrequent, especially on work directed by the Construction Division, though in other ways skilled and common labor usually took full advantage of opportunities to advance wages.

Inefficiency of labor and dearth of men competent to direct it combined to decrease daily output. Shortage of labor prevented penalizing inefficiency by the discharge of incompetents, because of the resulting sacrifice of speed which was not permissible, and also prevented the adoption of a piecework policy or the requirement of a reasonable minimum output per man-day.

Overtime was unavoidable and materially increased the labor costs. The necessity for speed compelled the general use on emergency construction, of a 10-hour working day although the basic 8-hour day fixed by the Government, in the act approved June 19, 1912, limited

to 8 hours in any one calendar day the service of mechanics and laborers on work under contracts to which the United States is a party. This limitation was suspended by Executive order because of the war emergency, and time and a half or double time was allowed for time worked in excess of eight hours, and for time worked on holidays and Sundays. The general use of overtime, expensive in itself, was the greatest single cause of high unit labor costs. It aggravated inefficiency and so entailed additional overtime and the knowledge that overtime at high rates was obtainable and encouraged operated to prevent the normal output per unit of time worked. Many workmen, paid on an hourly basis with extra time allowed for overtime, showed that they did not want an 8-hour working day and insisted on a 10-hour day even to the extent of striking, at the time of the armistice, for the right to work overtime.

The opinion was expressed by some executives in charge of war construction that a large proportion of the labor used would have been willing to work a 10-hour day on straight time had the Government not established an 8-hour precedent and required the payment of overtime. The opinion was also expressed, in October, 1918, that increase of wages had not increased but had impaired the Nation's output. This statement was based on the fact that many men were making so much money on war construction and production that they would work only intermittently. Similar conditions arose in private industry. For instance, coal mining companies, which pay by the ton, found that many of the miners, when paid more wages, insisted on working less days per week. Consequently the higher wages left the miners little, if any, better off and left the Nation and the consumers far worse off because of the coal shortage and the high prices so created. These tendencies were partially arrested on some of the war construction work by requiring a worker to put in the full amount of straight time each week before he could draw overtime.

The Secretary of War granted permission in the fall of 1918 to use some 20,000 limited service colored men from certain development and reserve colored battalions, to be furloughed to the Construction Division for voluntary work at current civilian wages for a period of six months with the privilege of requesting extension. These men were to be distributed by the labor procurement section of the administrative division on priority instructions of the building division.

The occasional use of troops to do construction work and the threat to use them in cases where it seemed to be justified was stated by constructing quartermasters usually to have proved effective in getting strikers back to work and in improving efficiency. At no time, however, were labor battalions, corresponding to those used for construction work by the overseas Army, employed on War Department construction in the United States.

The following general statement on labor conditions was made by Col. J. H. Alexander, chief of the administrative division of the Construction Division at the biweekly evening meeting of the members of the latter division held in Washington on August 12, 1918.

Labor to-day is paramount. The so-called labor problem is one of the most vital questions, if not, indeed, the most vital question of all the numerous problems that now confront us. It is no exaggeration to say that in the present crisis in which our country finds itself labor is the most vital matter of all the many really vital matters now affecting our lives and the destiny of both ourselves and our country.

Without labor no materials are possible—no materials to build cantonments, ships, and munitions of war. Without labor working at its maximum power to produce, our boys over there who are facing a ruthless enemy will not be able to get the necessary ammunition, without which they are absolutely helpless. It is not too much, indeed, to say that the entire outcome of the war depends upon the proper solving of the labor question.

The Government, shortly after the outbreak of the war, showed its appreciation of the part labor must play in the great conflict by bending every effort to keep conditions in the labor world quiet, settled, and peaceful, to the end that every workman in the land could produce at the maximum of his ability, for maximum production is a necessity second to none.

On June 19, 1917, the Secretary of War and Samuel Gompers, president of the American Federation of Labor, established the so-called cantonment adjustment commission when they signed an agreement stating that the union scale of wages, hours, and conditions in force where cantonments were projected should prevail and that all labor difficulties should be submitted to the commission for adjustment, with the understanding that consideration must, in the future, be given to circumstances requiring advances in wages or changes in other standards of working conditions. This understanding, by the way, has resulted in higher wages in every type of work done on War Department jobs.

This so-called Baker-Gompers agreement has been the beacon light in the consideration of labor difficulties ever since it was signed. Subsequently, by direction of the Secretary, the agreement was extended to cover all work done by the War Department during the war emergency.

It should be understood clearly that the extension of this agreement positively prescribed that the prevailing union wages and conditions must be put in effect on all construction work done for the Army during the present emergency.

It should also be remembered in this connection that while on March 24, 1917, President Wilson, by Executive order, suspended the eight-hour-day law for Government work, he at the same time directed that the eight-hour day should still be the basic day upon which to compute the rate of pay, and that all work above eight hours must be paid for at not less than time and one-half.

Early in the present year, as the labor situation became more and more acute, activities of the United States Employment Service were revived and there was created, by Executive order, the National War Labor Board, followed later by the War Labor Policies Board.

The War Labor Policies Board is administrative, while the functions of the National War Labor Board are judicial in that it is a court of appeal to attempt to adjudicate disputes between employer and employee. The basic principles of the National War Labor Board which, by the way, are indorsed by the President, called for the eight-hour day, time and one-half for overtime, no strikes or lockouts during the war, right of the workers to organize and bargain collectively, and no discharge for union affiliations.

The tremendous loss in production and wastage of man power caused by the great turnover in the labor market caused the Construction Division, by direction of the Secretary of War, early this spring to begin a study with the view of determining the feasibility and practicability of standardizing labor throughout the country so that workers would cease the steady migration from place to place by the lure of higher pay. This migration had increased since the war to such an extent that Secretary of Labor Wilson estimated that the labor turnover in some places had reached a high-water mark of 3,000 per cent per year.

The Construction Division, after a thorough study, submitted a plan for standardized rates of pay by which there were created three distinct zones in the country for unskilled workers and two zones for skilled workers. The decision on adopting standardized wages is up to the War Labor Policies Board, which is conferring with representatives of labor and business. The policy of the Construction Division is that standardization of wages and working conditions is necessary to stabilize conditions in the industrial world.

On August 1 the United States Employment Service, by direction of the President, took over the recruiting of all labor for war industries. A preliminary survey by that body has disclosed the fact that essential war industries are short 500,000 workers.

It is hoped that the standardization of wages and centralization of employment in the one agency will reduce the tremendous turnover of labor and end what has been well termed the individualistic strike that has caused such a great loss of production.

In undertaking the distribution of the labor of the Nation where it is most needed for successful prosecution of the war, the Employment Service has a task of tremendous magnitude and needs the cooperation of all—that includes, of course, the Construction Division of the Army which, since last year, has become the greatest single employer of labor in the country. It is now employing over 230,000 workers, skilled and unskilled, at an average of \$33.17 per week.

The following specific statement respecting labor conditions and problems experienced in building the Norfolk, Va., quartermaster terminal was made by Col. Millard A. Butler, constructing quartermaster in charge, at the biweekly evening meeting of the members of the Construction Division held September 30, 1918:

As regards our problems, I believe our real problem is labor. When we started to work at Norfolk at least seven other big Government jobs were near us. All were paying different rates of wages. The result was that it was impossible to get a working force who were contented and coordinated.

Finally a board of control was organized, consisting of representatives of the Navy, Shipping Board, Housing Bureau, Railroad Administration, and the Army. They coordinated wages in the tidewater district, putting each job on equal footing with every other job. We figured out that to complete our job on time we would need 10,500 men at work on June 15. There was a shortage then of 18,000 workers in the Hampton Roads district.

To get men there we decided to advertise our mess and housing conditions; to feed the men better and house them better than they were fed and housed on a job before.

So we built up our working forces until we had 10,500 names on the payroll, but they don't all work. We are housing men who are not giving value received for what they get. We can not make the men work, because they are getting a wage that permits them to lay off.

Then, too, there are strikes and the petty dissensions which every constructing quartermaster has to deal with. It appears that the men who howl the longest and hardest get raised, and when there is a raise in pay given one trade there follows a

seething underneath among the men and there occur strikes, petty strife, and men leave.

After the United States Employment Service took control of the labor situation, August 1, we did not get any labor for three weeks. Probably that was due to our ignorance as to how to go about getting the men. At any rate, since then we have been getting good results, though we have not gotten all the men we need yet.

A cost-accounting system was inaugurated by the Construction Division under the direction of the accounting division and made a feature of its later work. The object was to present the details of the total cost of projects, to make possible a reliable forecast of the ultimate cost of a project under construction, to facilitate the making of estimates on new work, to make comparisons of cost of units, buildings or projects, of like nature, and to provide the constructing officer and his superiors with such current data as to unit labor costs as would permit prompt checking of labor efficiency on each section of the work. This subject is dealt with at greater length in a subsequent section entitled "Costs."

The sequence of construction operations was, for various reasons, not always logical. The character and location of railroads and railroad facilities could not, in many cases, be so settled in advance that they could all be built first and serve construction needs. Roads, pavements, and hospitals were often built last instead of first as they should have been. Experience proved the important effect on ultimate speed and economy of pushing to completion as early as possible the construction of all these facilities, as well as the sanitation and utility services. To do this necessitated that the requisitioning bureaus promptly furnish complete and specific data and lay down all requirements affecting the settlement and construction of these features. The Medical Corps asserts that needless suffering was caused because of the occupancy of barracks before the hospitals were ready and points out that the hospital group should be almost the first buildings to be started in camp construction. This is doubtless true. Other testimony in this matter is to the effect that, for a number of camps, the needed decisions and adequate instructions as to character, location, and amount of hospital facilities were not supplied until work was well advanced.

Completion reports were called for on each project from the constructing quartermaster when construction was finished. These were ordered to include a report of the construction work and recommendations for the more expeditious and economical handling of future work. The experiences reported with and methods used to meet various labor and other problems are instructive and, with many other important matters affecting progress and costs, are set forth in these completion reports and summarized in the digests thereof, which were made by the Construction Division for record and reference.

The Construction Division has a maintenance and repair division, which is charged with the operation of the numerous utilities for and with the maintenance and repair of Army posts, cantonments, camps, hospitals, and other Army property. This work is under the direction of officers having the general qualifications of city managers. These activities are of the first importance, as the health of the Army and neighboring communities is dependent thereon. The utilities at a divisional cantonment are comparable in size and character with those of a modern city of 40,000 inhabitants and, in general, include the operation and maintenance of electricity, water supply, and distribution systems, sewers and sewage disposal plants, heating, plumbing, and laundry equipment, railroad facilities, roads, walks, wharves and drainage, and the care and improvement of grounds. At the armistice this division was responsible for the operation, maintenance, and repair of 453 military projects, widely diversified in character and location, which utilized the services of about 26,000 officers and men.

By placing this division under the Construction Division there was effected a mutually beneficial relationship and a harmonizing of accounting and statistical standards which permitted making comparisons and analyses that were helpful to both. The adoption of modern methods and policies and the general dissemination of valuable data and experience were promoted by this centralization of direction and supervision, and economies in design and construction and savings in overhead and operating costs were accomplished. The Board of Review has no suggestions to make respecting the methods or personnel of the maintenance and repair division, which seems to be well administered and operated.

A substantial saving in the expenses of administration and operation of similar utilities now managed by other bureaus should be securable, without impairment in efficiency or quality of service, by extending the responsibilities of the Construction Division so as to include the maintenance and repair of structures forming part of military establishments under the jurisdiction of the War Department and the operation and maintenance of the utilities connected therewith.

Much of the emergency construction in the United States done by the Construction Division for the War Department is of a character permanently useful in the economic and industrial life of the country, and unless a number of the important unfinished projects are carried to completion they will be without value and a loss to the Government. Of even more pressing importance, however, is the making of adequate provision for the conservation and maintenance of this great investment, which, according to estimates forming the basis of the military bill, will, in 1920, involve an expenditure of over

\$100,000,000. The operation, maintenance, and repair of this Government property demands the attention of some experienced and well-qualified bureau, but unless suitable provision is made, there will no longer exist any department familiar with and competent to care for it, because under the Overman Act, and without some affirmative action by Congress, the Construction Division, which now handles this maintenance work through its maintenance and repair division, ceases to exist four months after the declaration of peace.

The following statements were made to the Board of Review with special reference to the speed with which the war emergency construction work of the War Department was performed:

Maj. Gen. Wm. M. Black, Chief of Engineers, United States Army, stated to the board on June 7, 1919, that "the speed record of the Construction Division was all right."

Brig. Gen. C. McK. Saltzman, Acting Chief Signal Officer, stated to the board on May 16, 1919, that "the work done by the Construction Division for the Signal Corps was satisfactory."

Col. Floyd Kramer, Medical Corps, United States Army, chief of hospital division, stated to the board on May 8, 1919, for the Surgeon General, that "as a whole the Construction Division did its work promptly and cooperated with the hospital division."

Col. William H. Walker, Chief of Chemical Warfare Service, stated in letter of April 14, 1919, to the chief of the Construction Division, in accepting the Edgewood Arsenal plant, that "the work has been completed in a satisfactory manner and within the time required."

Col. J. W. Joyes, chief of nitrate division, Ordnance Department, stated to the board on March 5, 1919, his satisfaction with the work of the Construction Division. Such statement is quoted later in this section.

The Chief of the Construction Division has stated to the board that the division did not keep any of the War Department bureaus waiting. The information secured from the above and other witnesses generally bears out this statement. It was notably true of its initial tasks, the housing of the troops. The exceptions asserted by some witnesses seem to have been partly accounted for by the incompleteness of some of the requisitions made upon the division, partly by the inexperience or failure of certain contractors and partly by the occasional incompetence of subordinates.

To attain the necessary speed on such a variety of construction projects it was found to be essential that a technically and practically trained construction organization be used for the work and its chief given special authority to issue instructions by order of the Secretary of War. This enabled him properly to direct his work; to make final decisions as to methods, procedure, material, and personnel to be employed; to obtain first-class assistants specially skilled in the design and execution of the various branches of construction; and in general to have full control, authority, and responsibility as to all matters affecting speed, quality, and economy of work. The expe-

rience in engineering and construction of the division and section chiefs of the Construction Division eliminated much loss of time in discussion and debate and assured quick conception of requirements and the application of practical methods and orderly procedure in carrying them out, as was demonstrated by the manner in which the division got into action on its first work, the cantonment construction. These designs were made and their construction pushed rapidly despite unavoidable delays experienced in securing fundamental data from overseas as to the size of military units and from the Surgeon General's office as to other requirements. By making speed and sanitation the controlling considerations the cantonments were ready for occupancy in the early fall of 1917. This made it possible to train troops without delay and to place them on the fighting line in the spring of 1918. The practical elimination of water-borne and fly-borne diseases indicates that sanitation needs were met.

This cantonment work was a remarkable achievement of planning, preparation, and accomplishment of seemingly insuperable tasks effected by cooperation between Army officers and civilians in and out of uniform, so combining army knowledge with commercial and professional experience. The work was well conceived and executed and served all essential requirements and the necessarily prodigal use of labor proved its value by so expediting the training and arrival of the troops at the front as to shorten the war by a period which doubtless saved the entire housing cost many times over, apart from great saving of lives.

After the completion of the cantonments it was possible for the division to prosecute its work under better conditions of organization and to give more weight to economy of design and construction. For these reasons, in reviewing the work of the division, it is necessary to judge the cantonment and camp construction by different standards than those applied to much of the work subsequently executed.

For the position of Chief of the Construction Division administrative and executive capacity of high order and ability to inspire associates and subordinates with respect, confidence, and enthusiasm were required.

The Secretary of War, in presenting the distinguished-service medal to the Chief of the Construction Division, Brig. Gen. R. C. Marshall, jr., stated:

His zeal, judgment, and exceptional administrative ability in the Construction Division of the Army have enabled serious difficulties to be overcome and the construction necessary for the great Army to be provided.

The Chairman of the War Industries Board, Mr. Bernard M. Baruch, while en route for France, in a letter to the Chairman of the Board of Review, dated January 1, 1919, stated:

With reference to Gen. Marshall, I find him a very active, hard-working individual, who never lets the difficulties of his job force him even to blink an eye. Everything that I have learned about him causes me to respect him, and I think an investigation of his work will entitle him to all possible credit.

The Board of Review has had exceptional opportunities to observe the performance of the Construction Division and has been impressed with the tact and resourcefulness shown by its chief and the high regard had for him and his work by the members of the division and would here record its concurrence in the above-quoted statements.

The construction was done under general contracts which provided for payment on a basis of cost plus an agreed sum. It was necessary to do the work under this type of contract or a type of contract whereby the contractor would act as an agent of the Government, or by the Government itself on a purchase and hire, or force account basis. The cost is believed by the board to have been no greater, and probably less, than it was otherwise possible to secure. There are advocates of the use of other types of contracts, but, so far as known to the board, they have presented no facts or convincing speed record of accomplishment in support of their expressed opinions.

The cost of work done by the Cantonment and Construction Divisions was not swelled by extravagance of design or subordination of public to private or political interests. The Board of Review has endeavored, in the following tabulation, to indicate how, in its judgment, construction costs averaged on the work done by these divisions as compared with the costs of like Government work done under prewar conditions, using war prices, as fixed by Government bureaus, for materials and labor in each case:

(a) Extravagance (immoderate expenditure).....	Findings: Below normal as to plans and specifications; normal as to costs of materials (which were largely fixed by the Government); and above normal as to costs of the field construction forces.
(b) Waste (expenditure made without obtaining useful results).....	
(c) Dishonesty (losses from deceptions practiced for private gain).....	
	Findings: Below normal as to plans and specifications, procurement of materials and field office forces, and normal as to field working forces.

Matters of finance and accounting of funds and property attained great importance. The Government methods prescribed for handling them resulted in serious delays in making final settlements with many contractors, because of the lack of control over these matters given to the Construction Division. These delays were expensive to the Government and worked hardship upon contractors and disbursing officers who are not released from bond or liability until final

settlements are effected. It has been impossible to get the final audits made until long after the completion of work and the disbanding of the field forces. These difficulties would have been minimized and better results obtained had the Construction Division been authorized to direct its own finance and accounting of funds and property on each project and been made directly responsible therefor to the Treasury Department.

In quickly procuring and mobilizing construction material the division was notably successful. This was due to its direct control of most of its purchases and shipments. The speed realized and the amount of work done by it could not have been approximated if it had not directed its own procurement of materials, nor if such procurement had been transferred to a central purchasing bureau, as was advocated by some. This subject is dealt with at greater length in the section entitled "Consolidation of Government procurement," in which are given the reasons which necessitate the purchase of material for construction by the construction bureau, and not as an incident in a much greater volume and variety of purchases, largely of supplies and finished articles for operation, by the Division of Purchase, Storage, and Traffic.

It is believed by the board that operations must depend on supply and that both must depend on construction, and that the supply and the construction bureaus should be kept separate, and that the construction bureau should be given an independent status, so making its services available wherever needed. Conflict of the two purchasing departments could readily be avoided by cooperation.

It seems to the board to be inexpedient to transfer the whole or a part of either the procurement branch or the finance and accounting branch of the Construction Division to any other bureau. Information obtained indicates that such branches should be left with the Construction Division and that they should be given authority and power commensurate with their duties and responsibilities. This conclusion is further supported by the fact that the large sums involved in incompleting and unsettled outstanding contracts constitute an enormous Government liability, the proper settlement of which can be made only by agencies and individuals familiar with the details and conditions pertaining to such contracts. If the settlement of large Government contracts made by the Construction Division is turned over to departments or individuals unfamiliar therewith or with whom these construction contract settlements are but one item in a great number of contract cancellations, the interests of the Government may be jeopardized and settlements delayed. It is most desirable, in justice to all interests, that such delays be avoided.

Appropriate ratification by Congress should be given to clear properly the acts and records of deserving officers of the Construction

Division, in order to render justice to men who acted with decision under the stress of war conditions, when hesitation or delay would have been fatal. This statement applies especially to the financial and property accounting of constructing quartermasters, many of whom evidently had to meet conditions without adequate authority and felt they were morally bound, though perhaps not legally authorized, to act first and explain later.

The Board of Review has endeavored to obtain from all available sources a thorough knowledge of the essential facts relating to the Construction Division and its work. In the conduct of its review the board issued an exhaustive questionnaire to about 200 emergency construction projects and so collected much accurate data in comparative form; obtained and studied numerous pertinent reports from Government bureaus; secured at its hearings the attendance and testimony of many witnesses, including officers and civilians from most of the War Department bureaus, members of labor boards, contractors, and others competent to criticize and express judgment upon the performance of the Construction Division and of other War Department bureaus which had done war construction; gave special attention to organization, methods, results, speed, economy, quality and cost of work and opportunities for improvements; and visited and made field inspections of construction projects. A summary of its general findings and conclusions is given in the following paragraphs, specific points being dealt with in the later parts of this report:

The Construction Division of the Army earned the respect and confidence of substantially all of those with and for whom it worked, especially as to its grasp of actual and probable requirements and its speed of execution.

The plan of organization, methods, and procedure, taken as a whole and measured by results accomplished, seem to average higher than those of any other War Department bureau with which the board has dealt and it can suggest no improvements therein except for certain minor changes, largely in accounting procedure, which could be made to advantage if the division were given additional authority or a military position higher than its divisional status. Its present plan of operations provides properly for centralization of advisory and directing functions, decentralization of supervisory and executive functions, and expansion to meet construction requirements of almost any character.

Its personnel showed unusual ability, energy, and courage in grappling with the big problems of design, administration, and construction which were thrown upon them and demonstrated capacity and competency to handle such work satisfactorily. The standards and methods adopted in the selection of its personnel and the character

of men chosen reflect credit upon the chief of the division and his advisers. They showed discrimination in the choice of officers, took special pains to put the right man in the right place, where he could work at maximum efficiency, and, in order to eliminate guesswork and selection based on impressions, endeavored to choose only men who have made good and to put them on a class of work with which they were familiar.

The division was itself responsible for creating its present plans of organization and operation. It developed a high order of teamwork by the use of picked men having experience, enthusiasm, and self-confidence, who seem to have been singularly free from pessimism and jealousies, handled work more by mutual suggestion and patriotic self-subordination than through orders and the exercise of authority, and realized their responsibility for promptly supplying the structures and plant facilities essential to the production work of other war bureaus. These men showed zeal, ability, and results of the highest order and were tireless in their efforts to create such a noncombatant army of workers as would ensure the quick construction of all facilities required to maintain an uninterrupted flow of supplies to the Expeditionary Forces.

The Board of Review is of the belief that this work was done at a cost which was greatly increased by national unpreparedness but which could not have been lessened by placing the work with any other military or civilian bureau.

The following statement respecting the Construction Division and its personnel was volunteered by J. W. Joyes, Colonel, Ordnance Department, United States Army, chief of the nitrate division of the War Department, at a hearing held by the Board of Review on March 5, 1919:

I was very agreeably surprised in the functioning of the Construction Division. I had been opposed to them at one time, principally because I felt that the bringing into my work of any additional outside agencies would complicate things worse than they were before; and it was only when it became apparent to me that my official superiors felt it advisable to bring them into the nitrate jobs that I gave my recommendation to that effect. However, I found the men at the head of the Construction Division very practical, very able, and very anxious to cooperate in a broad-minded manner. I would like to quote Mr. Cranford as giving the highest praise to the Construction Division.

The Board of Review is of the opinion that the Construction Division should not be disbanded after the accomplishment of its specific war work but should be utilized to coordinate and handle Army construction and related work in peace times and that the Government can further its interests in no more effective way than by continuing and extending the consolidation of its construction work.

PART II.

CREATION, HISTORY, ORGANIZATION, PERSONNEL, DUTIES, METHODS, PROCEDURE AND RESULTS OF THE CANTONMENT DIVISION.

SECTION 7.

CANTONMENT AND CAMP SITES.

SELECTION OF SITES.

The selective service act became a law on May 18, 1917, and it at once became necessary to provide adequate sites and camps for training and housing a large force of troops. On April 23, 1917, the Chief of the War College Division issued the following instructions:

(1) The Secretary of War having approved division of the United States into 16 training areas, steps should be taken without delay definitely to select camp sites to enable the supply departments to make arrangements necessary for sheltering, feeding, and equipping the forces.

(2) The War College Division can not of itself do this intelligently, but it is a proper function of the General Staff to outline a policy to govern in selecting sites. Such questions as sanitary requirements and transportation facilities are self-evident. Other questions are: Should there be division, brigade, or regimental camps? Should foot and mounted services be trained separately? Size of camps to afford space for maneuvers and firing?

(3) Your committee having charge of drafting of regulations for carrying out the National Army plan is designated to study this question and to submit recommendations as early as practicable. Your recommendations should include the agency to make selection of camp sites, whether department commanders or special boards or officers acting directly under War Department.

On May 4, the Chief of the War College Division reported, by memorandum for the Chief of Staff, that the division had made a careful study of the matter of selection of camp sites for training new troops and was of the opinion that department commanders should be charged with the duty of making such selections for the troops to be raised or trained within their respective departments and that they should appoint boards of officers to investigate and report upon available camp sites.

He recommended that the number of such boards in each department be left to the discretion of the several department commanders; that each board be composed of two experienced officers of the line, one of whom should, when practicable, be the division commander concerned or his representative, one an officer of the Quartermaster Corps, one an officer of the Medical Corps, and one a district engineer;

and that the requisite number of district engineers, selected for their knowledge of local conditions, be placed under the orders of each department commander for detail on these boards.

This memorandum laid down certain policies and standards to guide in the selection of the sites and stated that:

(1) Property owned or leased by the United States and controlled by the War Department should be utilized wherever suitable and available.

(2) Wherever practicable troops should be grouped by divisions.

(3) In case it is impracticable to secure divisional sites, efforts should be made to select sites for brigades or larger parts of divisions. * * *

(4) Sites for commands smaller than a brigade will not be selected unless it is impracticable to secure brigade camp sites.

(5) It is impracticable to specify the amount of terrain that will be required for the training of commands of the various sites. * * * It is essential, however, that each camp site—

(a) Be of sufficient size to accommodate the command without crowding.

(b) Have an adequate water supply for both the men and animals to be encamped thereon.

(c) Contain within itself or be located within convenient distance of an adequate training area.

(d) Contain within itself or be located within convenient distance of suitable ground for target practice.

(e) Be located upon or near a railroad of sufficient capacity to insure the convenient supply of the command and its prompt movement in case of need.

(f) Can be leased (if not already owned or leased by the Government) for one or two years, with the option of renewal from year to year for about five years.

(g) Be immune from floods and inundations.

(6) The following very desirable features should be secured whenever practicable:

(a) The soil should be sandy loam with good drainage.

(b) The surroundings should be healthful.

(c) An A and a B range within convenient distance.

(d) An artillery range within convenient distance.

(e) The site should afford natural bathing facilities, such as streams, lakes, or the sea.

(f) The site should be adjacent to a city or large town containing facilities for healthful and attractive recreation.

(7) The following desirable features are not so important as those enumerated under (6), but they should not be overlooked as they tend toward efficiency, economy, and the welfare and contentment of the command:

(a) Roads, good or potentially good.

(b) Infrequent interruptions to training by inclement weather.

(c) Grazing for animals within convenient distance.

(d) Absence of insect pests.

(e) Good strategical location.

(f) Location central with respect to training area.

(g) Material for temporary shelter locally obtainable in sufficient quantities at reasonable prices.

(h) Mechanical, skilled, and common labor locally obtainable at reasonable wages.

(i) Site and training areas donated or offered at low rental.

(j) Good markets at reasonable prices.

(k) Adequate local control of social evil and the liquor traffic.

(l) Adequate local regulations of monopolies and price-discrimination.

It recommended that cantonments for one infantry division, certain corps auxiliaries, and unassigned troops should be constructed in each of the 16 training areas.

It recommended that sites for 16 infantry divisions of the National Guard also be selected at once, and that sites for 14 of these National Guard divisional camps be located in the Southern, Southeastern, and Western Departments, and that two be located on the Pacific coast, where "training will not be interrupted by inclement weather."

It recommended the number of these troops to be mobilized in each department, designating that there should be the following divisional cantonments and camps: One National Army cantonment in the Northwestern Department; 4 National Army cantonments in the Eastern Department; 3 National Army cantonments and 9 National Guard camps in the Southeastern Department; 6 National Army cantonments in the Central Department; 1 National Army cantonment and 5 National Guard camps in the Southern Department; 1 National Army cantonment and 2 National Guard camps in the Western Department.

On May 6 the Chief of Staff, by the direction of the Secretary of War, ordered the Adjutant General of the Army to proceed at once with this plan, to select the sites, to lease on behalf of the United States any selected tracts not already owned or leased by the Government and to make report of the sites selected not later than June 10. He also directed that the Quartermaster General be instructed to provide the shelter and other construction required on each site for the accommodation of the troops to be maintained thereon as soon as practicable after he was notified of its selection; and that the chief of each supply bureau be instructed to prepare to supply the organizations to be camped on each site.

On May 11 the orders to select these sites were sent by telegraph to the several department commanders. At the same time the Quartermaster General was directed to select and assign at least one thoroughly qualified quartermaster to take charge of the work and to do all the preliminary work such as the location of supplies of lumber and other material, the collection of labor, the blocking out of plans for the camps, etc., that could be done before the money became available for the construction work.

On May 12 another telegram was sent to each of the department commanders notifying them to take no steps toward securing supplies of lumber and other building material or attempting to collect labor, as this would be done by the Quartermaster General through the committee on sites of the Council of National Defense and through the large contractors of the country.

On May 29, by memorandum to The Adjutant General from the Acting Chief of Staff, by direction of the Secretary of War, the con-

struction of the 16 divisional camps for the National Guard was postponed until otherwise ordered, as it was feared that the building of these and 16 divisional cantonments at once would be too great a strain on supplies, labor, and transportation. Moreover, at that time there were not sufficient funds appropriated for the carrying out of the larger program.

On June 28 the department commanders were notified of the cancellation of previous orders, which were to the effect that the "National Guard divisions in the north would not be sent south this summer," and were directed to complete leases for National Guard camp sites already selected.

On July 13, 1917, The Adjutant General of the Army was notified by the Acting Chief of Staff that the Secretary of War directed:

(a) That the department commanders concerned be directed to expedite the leasing of National Guard divisional training camp sites.

(b) That as soon as leases for these camp sites had been entered into the necessary preparation of such sites for occupancy be undertaken.

(c) That all construction and preparation of National Guard divisional training camps for occupancy be carried out under the supervision of the officer in charge of cantonment construction, Quartermaster General's office.

(d) That no National Guard unit be ordered to its divisional training camp until the camp for such unit has been reported ready for occupancy by the Quartermaster General.

(e) That the Quartermaster General be directed to prepare and submit estimates at once for cantonment construction at the National Guard training camps.

(f) That the Quartermaster General and Chief of the Militia Bureau * * * and all department commanders be notified in accordance with the foregoing.

REAL ESTATE.

The sites for the 16 National Army cantonments were leased for one year with the privilege of annual renewal in all cases except three—Camp Funston, on the Army reservation at Fort Riley, Kans.; Camp Pike at Little Rock, Ark.; and Camp Lewis, at Seattle, Wash. In the last two cases the land was given to the Government by deed on condition that the Government maintain permanent Army cantonments at those places, the land reverting to the original owners when abandoned by the Government.

Some of the sites were covered by a single lease running from a local board, such as a chamber of commerce or a special organization, acting in the interest of the community. In other cases the site comprised a number of parcels leased from several owners. In nearly every instance additional land was needed, and for this leases were made by the Government with the owners.

The sites for the 16 National Guard camps were also leased, with the exception of Camp Doniphan, at Fort Sill, Okla., and Camp McClellan, Anniston, Ala., which were built upon Government reservations.

Other camps were built after the completion of the National Army cantonments and 16 National Guard camps. Of these the site for Camp A. A. Humphreys, at Accotink, Va., for the Engineer Corps, and the site for Camp Abraham Eustis, Lee Hall, Va., for the Coast Artillery, were purchased; and the sites for the embarkation camps, Camp Mills, Long Island, N. Y., and Camp Merritt, Dumont, N. J., were leased. These leases were renewed in 1918.

TABLE 1.—Data on National Army and National Guard camp sites.

NATIONAL ARMY CANTONMENTS.

Camp.	Area in fee.	Original area leased.	Additional area leased.	Rental original area.	Annual rental thereafter.
	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>		
Custer.....		5,996	2,997	\$89,940.00	\$53,595.00
Devens.....		10,681		65,940.00	65,940.00
Dix.....		6,848		162,760.00	55,770.00
Dodge.....	279	2,914	2,295	27,358.90	64,342.00
Funston ¹	19,447				
Gordon.....		2,467	2,295	14,875.00	46,231.00
Grant.....		5,654		113,521.00	113,086.00
Jackson.....	1,192	11,609	1,530	29,721.00	33,725.00
Lee.....		9,387	325	142,834.00	147,055.00
Lewis ²	76,000				
Meade.....		9,338	257	70,040.00	72,335.00
Pike.....	4,974.5	10,000		1.00	1.00
Sherman.....		6,037	3,153	34,926.00	86,738.56
Taylor.....		2,440	1,048	1.00	36,282.00
Travis.....	2,567	3,266		9,723.00	8,533.00
Upton.....		15,213		13,557.00	13,557.00

NATIONAL GUARD CAMPS.

Beauregard.....		3,047.	13,996	\$1.00	\$1.00
Bowie.....		³ 2,173.21		1.00	1.00
Cody.....		8,015	⁵ 5,520	1.00	1.00
Doniphan ¹	{ 51,292.82 16,420 }				
Fremont.....		7,203.38		40,169.48	40,169.48
Greene.....		6,734.4		8,700.00	8,700.00
Hancock.....	112.15	13,488.91	322.06	53,672.00	⁴ 312.19
Kearney.....		12,720.93		1.00	1.00
Logan.....		8,564.5	995.83	37,709.68	40,387.92
MacArthur.....		⁵ 1,509.9	507.17	8,148.84	13,140.48
McClellan ⁶	18,800				
Sevier.....		13,661.87		26,548.20	26,548.20
Shelby.....		⁵ 5,480		1.00	1.00
Sheridan.....		7,381.94		7,727.92	7,727.92
Wadsworth.....		16,165.2	609.43	30,411.04	37,695.64
Wheeler.....		3,578.79		4,492.28	

¹ Located on existing Government reservation.² Donated in fee during Army occupation.³ 3,745 acres used but not leased.⁴ After June 30, 1919, rental \$27,965.29.⁵ Does not include artillery range.⁶ Purchased in fee, \$247,475.

SECTION 8.

COMMITTEE ON EMERGENCY CONSTRUCTION.

Coincident with the selection of the sites it became evident that the Government must undertake a large construction program in order to house the National Army and the federalized National Guard to be raised by the selective-service act.

This act, authorizing the President to increase temporarily the Military Establishment of the United States, was approved May 18, 1917. The problem of housing and training the troops was brought to the attention of the General Munitions Board of the Council of National Defense early in April. For its consideration the committee on emergency construction of buildings and engineering works, later termed committee on emergency construction, was organized on April 28, 1917, with the following personnel: G. W. Lundoff, Cleveland, Ohio, chairman; M. C. Tuttle, Boston, Mass.; W. A. Starrett, New York, N. Y.

The resolutions defining the duties of the committee were, in part, as follows:

To suggest forms of day's work contracts applicable to the construction of cantonments and similar enterprises where rapidity in construction is essential; to formulate plans and methods of expediting the construction of housing facilities in connection with engineering and construction work and activities essential thereto.

This committee was formed after several interviews of Mr. M. C. Tuttle with Mr. F. A. Scott, chairman of the General Munitions Board, to whom he pointed out that the Government would have a vast building program, not only in connection with the cantonments which would shortly have to be built to house the Army to be called, but also for manufacturing all sorts of war material. The committee's study of the probable requirements of the Government indicated that the building work would be Nation-wide in its scope and practically coextensive with the war. Mr. Lundoff was appointed chairman of the committee and served in that capacity for the first week or two. Maj. William Kelly, Corps of Engineers, and Mr. Frederick Law Olmsted were made members shortly after the formation of the committee. The committee was later reorganized, and Mr. W. A. Starrett, who had received a major's commission in the Corps of Engineers, United States Reserves, was made chairman. One reason for this change was that the report of May 9 indicated that the duties of the committee would include dealings with the contracting industry. Messrs. Lundoff and Tuttle were builders, whereas Maj. Starrett was an architect and engineer by profession and might be considered to occupy a more disinterested position. Mr. Tuttle and Mr. Lundoff withdrew their concerns from consideration by the committee on emergency construction for any work on the Government's building program.

Early in June, 1917, Mr. Lundoff resigned, and in the latter part of July Maj. Kelly was ordered into the service in France and ceased to act as a member after about August 1, 1917.

FORM OF CONTRACT FOR EMERGENCY WORK.

The first matter considered by the committee was the proper form of contract. It immediately became apparent that the methods required by law for placing Government contracts—namely, advertising for lump-sum competitive bids and the award of contract to the lowest bidder—were incompatible with speed requirements and could not be followed for the reasons, among others, that no complete plans or specifications were available and, as the sites had not even been determined at that time it was necessary that construction and design should proceed concurrently. It was laid down as a premise for this contract that the work must be done so speedily as to meet the emergency. This condition made it necessary to start construction work at once and to follow with detailed plans and specifications as soon as possible.

In collecting the information necessary for drawing a workable and satisfactory contract, the committee invited to Washington and interviewed many of the leading engineers and contractors of the United States and discussed with them the desirable features of such a contract and particularly the matter of compensation. On May 9, 1917, the committee made its first report to the General Munitions Board. It called attention to the fact that under the disturbed conditions in the building and contracting market it would be unwise and impracticable to attempt to let emergency construction work on fixed-price contracts and recommended that all such work be let on the percentage or cost plus basis. It stated that the objects in letting emergency contracts should be three:

- (1) Delivery of buildings, structures, or work on time.
- (2) Maintenance of necessary standards of quality.
- (3) Maintenance of lowest possible cost consistent with the foregoing (1) and (2) in the order named.

The committee first proposed a contract fixing the amount of fee to be paid the contractor by means of a sliding scale of percentages which ranged from ten per cent for contracts under \$100,000 to six per cent on contracts over \$535,714.29. It recommended that no bonus or forfeiture clause should enter into any contracts; that the contractors undertaking the work should be carefully selected by a responsible committee; and that no contractor should be allowed to undertake the work—

(a) Whose responsibility has not been established by a record of two years of successful experience in the contracting business.

(b) Who has not performed a single contract at least three-quarters as large as the contract for which he is being considered or to a value of \$500,000.

(c) Unless the work he has been performing has been of a character somewhat similar to the construction under consideration.

(d) Unless, in the opinion of the committee, he owns a plant suitable for the work.

(e) Unless he submits a sufficient proof of a capable organization to conduct the work.

(f) Unless he should conduct his work under an accounting system that would be satisfactory to the auditors to be appointed by the Government to check and audit his accounts.

(g) Unless a sworn statement of the contracts he has performed for the period of the past two years, together with names and addresses of owners and engineers or architects who had charge of such work, is filed with the authorities in charge of letting the work.

It also recommended articles in the contract governing the prompt payment by the Government to the contractor; the definition of cost; the definition of methods of charging for construction plant; a standard schedule of rentals for tools and equipment; the furnishing of a bond for faithful performance by the contractor; liability insurance to be carried by the contractor; the Government's right to furnish materials for use in connection with the construction; the Government's right to terminate the contract if progress were unsatisfactory; the control and supervision by the Government of all subcontracts let by the contractor; the authorization of any departure from the standard rates of wages paid in the project locality; and finally the exclusion of any contractor failing in the prompt and faithful performance of his contract from further emergency construction contracts for the Government.

This report was accepted by the General Munitions Board and, under its instructions, the committee took up the study of the form of contract in detail. After conferences lasting over a month, in which the officers of the Cantonment Division, attorneys for the Council of National Defense, the accountancy committee of the General Munitions Board, various bureau chiefs and representatives of the Judge Advocate General's office and of the comptroller's office were consulted, the standard form, later known as the Contract for Emergency Work, was drawn. It was designed on the basis of paying cost plus a stipulated profit. This principle of the cost-plus contract, in which the owner supervised the work and all elements entering into cost, had been approved by the Secretary of War on May 30, 1917, in a memorandum to the Quartermaster General relating to contracts for the Fort Oglethorpe cantonment. The Contract for Emergency Work was accepted and ratified by the General Munitions Board on or about June 6, 1917.

Various representatives of the Navy attended the meetings of the committee during the drafting of the emergency contract. When the deliberations were about finished and the contract near its final draft, Admiral Harris, then in charge of the Bureau of Yards and Docks, wrote Mr. Scott, Chairman of the General Munitions Board, that he regarded the proposed contract as inadequate. The Navy did not use this form of contract for its emergency work. It is reported

that while much Navy work was let on the lump-sum basis, considerable was let on the basis of paying cost plus 10 per cent. The Board of Review has seen none of these Navy contracts.

The standard form of contract is dealt with in further detail in Part III, in the section entitled "Contracts division," which gives the changes that, based on experience, were later made therein. Its general features and the results secured thereunder have already been treated in Part I, in the section entitled "War Department Contracts for Emergency Work."

SELECTION OF CONTRACTORS.

Immediately after the submission of its report of May 9, 1917, and while the features of a standard form of contract were still under discussion, the committee on emergency construction was instructed by the General Munitions Board to prepare a list of contractors properly qualified to undertake the proposed work.

The committee accordingly addressed a questionnaire to various members of the American Institute of Architects and of the American Society of Civil Engineers, to the chief engineers of leading railroads, and to engineers of Government naval stations to secure information as to the ability, standing, and integrity of available contractors. These questionnaires soon developed a list of about 1,400 contractors located throughout the United States. To these contractors was addressed a questionnaire to secure their own representations and statements concerning their going organizations and experience.

The information thus obtained was placed in a suitably indexed file and cross-indexed geographically in order to locate quickly suitable contractors in any section of the country. The file also contained reports, confidential and otherwise, received from various sources, including commercial agencies, customers of the contractors, banks, surety companies, and the Federal Secret Service. New information was added as it was obtained, in part, by supplemental questionnaires issued at intervals of from three to six months to the listed contractors.

This file was kept up to date by the committee on emergency construction until its dissolution early in 1919.

Selections of contractors were made largely on the basis of their past experience. The findings of the committee were reported to the General Munitions Board which passed thereon and forwarded its reports to the Chief of the Cantonment Division who, after submitting his reports and recommendations to and receiving the approval of the Secretary of War, entered into the necessary contracts for building the cantonments.

On or about August 15, 1917, the Secretary of War, in response to certain criticisms that organized labor was not being properly represented, requested, in a letter written to the chairman of the com-

mittee, that it be given consideration in deliberations as to the choice of contractors. The committee on emergency construction laid the matter before the War Industries Board, the successor of the General Munitions Board, which decided to add a labor member. Mr John Donlin, the representative of the building trades in the American Federation of Labor, was accordingly appointed and thereafter served as a member of the committee.

On January 1, 1918, Mr. Tuttle resigned from the committee on emergency construction to become production manager of the Shipping Board. In July, 1918, Mr. Olmsted resigned to take up duties with the United States Housing Corporation.

On March 15, 1918, Maj. C. Foster was made a member of the committee, which, on the signing of the armistice, was composed of Col. W. A. Starrett, chairman; Mr. John Donlin, and Maj. C. Foster.

After full consideration the Board of Review is of the opinion that the contractors, as a whole, were selected wisely and compared favorably with those doing large work for municipalities and private corporations. It would probably have been better, in the cantonment and camp work, if more use had been made of contractors having past experience on rough work in open country involving the rapid construction of facilities for housing and rationing thousands of men. Difficulties incidental to such labor problems and to the prevailing labor conditions at first caused disappointing progress at some of the camp sites and necessitated occasional reorganization of the forces and methods of a contractor.

FORMATION OF SUBCOMMITTEE ON ENGINEERING.

About June 1, 1917, when sites for the cantonments had been selected by the department commanders and approved by the Secretary of War, it became necessary immediately to investigate them thoroughly. No funds were available for this purpose. However, a subcommittee of the committee on emergency construction, known as the subcommittee on engineering, was appointed to work with the main committee, reporting through one of its members, Mr. Frederick Law Olmsted. Its personnel was Mr. Leonard Metcalf, of Boston, Mass., Mr. George W. Fuller, of New York, N. Y., and Mr. Asa E. Phillips, of Washington, D. C. This subcommittee made an appeal to many engineers, town planners, and sanitary engineers, throughout the country, who were personally known to its members, to aid in studying the conditions at the cantonment sites and submit reports on the local conditions. These reports were to cover:

(a) Transportation facilities and betterments needed for delivery of materials for rapid construction.

(b) Topography, and adequacy of area to allow the needed structures of the cantonment to be grouped conveniently, so as to form a well coordinated camp plan, together with conditions as to soil, drainage, occurrence of mosquitoes, etc.

(c) Most suitable source of safe and ample water supply.

(d) Arrangements as to sewerage, including general plan for disposal of sewage without nuisance.

This appeal met an immediate response from members of the engineering profession.

In general, it was arranged by those dealing with these affairs at Washington to have at least two civilians investigate conditions at each cantonment site, one of these being a town planner and the other an engineer expert in matters of water supply and sewerage. In several cases additional men were placed on the local board and, wherever practicable, engineers familiar with sanitation conditions in the vicinity of the cantonment site were consulted.

These local engineering boards did their work quickly and creditably. A number of them brought their data to Washington to explain the main features in person to those in charge of the engineering work of the Cantonment Division.

These engineers and town planners, who rendered services of the greatest possible value, did so at their own expense, as there was no one in Washington empowered to contract with them for the work. They were paid later on an arbitrary basis, arrived at by the establishment of a per diem fee for the chairman and a somewhat lower fee for the other members and a lump sum contract made with them to cover both fees and expenses. The per diem rate was nominal and less than the usual charges for such engineering work.

The table given below lists the civil engineers and town planners who aided in making these preliminary reports for the 16 National Army cantonments.

TABLE No. 2.

Cantonments.	Civil engineers.	Town planners.
Devens.....	Frank A. Barhour.....	H. J. Kellaway.
Upton.....	Walter E. Spear.....	
Dix.....	Allen Hazen.....	Charles Leavitt, jr.
	John D. Kilpatrick.....	
Meade.....	Morris Knowles.....	Owen Brainard.
Lee.....	H. R. Messer.....	James L. Greenleaf.
	Allen Saville.....	
Jackson.....	P. H. Norcross.....	Richard Schermerhorn, jr.
Gordon.....	James N. Hazlehurst.....	A. F. Brinckerhoff.
	G. R. Solomon.....	
Pike.....	Black & Veach.....	George E. Kessler.
		L. V. Sheridan.
Sherman.....	R. Winthrop Pratt.....	Warren H. Manning.
	William H. Dittoe.....	
	J. W. Ellms.....	
	Clarence Hoover.....	
Taylor.....	James B. Wilson.....	Harlan P. Kelsey.
Custer.....	Samuel A. Greeley.....	Thomas W. Sears.
Grant.....	Alvord & Burdick.....	E. H. Bennett.
Dodge.....	Louis P. Wolff.....	Robert Wheelwright.
Funston.....	Wynkoop Kiersted.....	J. S. Pray.
		S. Herbert Hare.
Travis.....	E. N. Noyes.....	George E. Kessler.
Lewis.....	William J. Roberts.....	Carl F. Pilat.

The work of the subcommittee on engineering saved weeks in the construction of the cantonments and was of great benefit in other ways. After submitting the reports of the local boards the subcommittee cooperated with the engineering and constructing forces of the Cantonment Division in solving problems of the camps.

This subcommittee, with the addition of Mr. L. B. Stillwell, also prepared a report upon and made recommendations respecting standard forms of contract for employing engineers and engineering concerns as supervising engineers. (See also Contracts.) This was done in order to standardize relations and business arrangements with such engineers. These forms of contract were used by the Cantonment Division wherever outside engineering services were required and also in connection with the field work of cantonment construction.

OTHER ACTIVITIES OF COMMITTEE ON EMERGENCY CONSTRUCTION.

With the commencement of cantonment construction the committee on emergency construction assisted in putting the Government quickly in touch with lines of building supplies and other materials by forming trade committees representing many of the different lines of industry. It called representatives of various industries to Washington and requested them to organize as far as practicable so that the Government could deal with a single individual representing the whole of each industry. This resulted in the establishment of trade committees, some of which kept permanent representatives in Washington.

The committee on emergency construction also aided the Chief of the Cantonment Division in planning his organization and in securing the needed personnel to make plans and specifications; to administer and supervise the field construction; to mobilize purchases; to provide proper transportation facilities, and to organize a finance division for keeping the complex accounts necessitated by Government requirements and the unusual size of the operations. These affairs are dealt with in more detail in the section entitled "Conception and organization of the Cantonment Division."

Since the organization of this committee it has been called on for advice and assistance by branches of various Government bureaus other than the Cantonment Division and the Construction Division—notably by the Signal Corps, the Ordnance Department, and the Corps of Engineers. The problems submitted pertained to building construction, the selection of contractors and the prevention of duplication of effort, and bureau competition for materials, all with the view of saving time and money on construction work.

SECTION 9.

CANTONMENT DIVISION OF THE ARMY.

After the General Munitions Board of the Council of National Defense had instructed its subcommittee on emergency construction to draft a suitable contract for emergency work, and prior to the adoption of this contract, it became apparent that a Government organization unlike any then existing would be necessary properly to administer and supervise the work to be done under such contract.

The construction and repair division of the Quartermaster General's office had been charged with the comparatively small amount of construction work previously undertaken by the War Department. The personnel of this division in May, 1917, consisted of Col. I. W. Littell and Capts. W. H. Oury and R. C. Marshall, jr., all of the Regular Army, and a force of 18 clerks; the technical branch of this organization being in charge of a civilian advisory architect, Mr. F. B. Wheaton, with a force of 35 engineers, draftsmen, and clerks. This division had general supervision of all construction and repair work at Regular Army posts, the renting of buildings, leasing of land, preparation and custody of historical records, and many other like matters.

Prior to the entry of the United States into the War an increase in the Regular Army had been authorized by the national defense act, approved June 3, 1916, which provided that the Army be increased by regular increments covering a period of five years. By the spring of 1917 one increment had already been enlisted and, on account of then existing conditions, orders had been issued to enlist at once the other four increments. The instructions given to the construction and repair division of the Quartermaster Corps required that quarters for these troops be furnished at existing Army posts by building the necessary additional quarters to accommodate those not provided for by existing buildings. This necessitated the construction of barracks and quarters for about 150,000 officers and men. This division was at the time, constructing officers' training camps at various Army posts as authorized by the same act.

The figures submitted to the General Staff by the War College division, pursuant to the selective service act, called for accommodations for approximately 649,000 troops for the National Army and 438,000 troops for the National Guard, or a total of about 1,100,000 officers and men.

It was soon realized that the construction organization of the Quartermaster General's office was neither suitable nor of adequate size to handle this large amount of work.

On May 16, 1917, the Secretary of War approved the recommendation of the General Munitions Board that Col. Littell, the

officer then in charge of the preparations being made for the building of these cantonments as well as the ordinary construction and repair work of the service, should be detailed exclusively to the work of cantonment construction. This was with the understanding that he would have the cooperation and facilities of the committee on emergency construction; that the members of the committee were to act with him in such capacity as he might direct; that he should transfer his office, together with his force of subordinate officers and clerks, into rooms provided for him by the General Munitions Board in the Munsey Building, where he was to be furnished with all necessary assistants; and that all cost reports and other papers pertaining to cantonments should accompany him. By this transfer Col. Littell was to be "freed from routine duties and therefore able to devote all his time and talents to the great task ahead." It was also the expressed intention of the General Munitions Board to furnish him adequate civilian assistants. This could then be done better in the Munsey Building than in the War Department offices.

On May 19 the Cantonment Division of the Army was created, with Col. Littell as its chief, and he was granted special authority by The Adjutant General of the Army:

- (1) To report direct to the Secretary of War.
- (2) To communicate direct with the department and division commanders by the order of the Secretary of War.
- (3) To give written instructions to civilians and to officers for all travel connected with this work, furnishing copies of same to The Adjutant General's office.

On May 22 the committee on emergency construction recommended to the Chief of the Cantonment Division that he separate the work to be done by this division into two subdivisions, placing the 32 cantonments to be occupied by the National Guard and National Army in one class, and the additional cantonments and extensions to existing Army posts to house the additions to the Regular Army in another class. It also submitted a plan of organization and chart showing these two subdivisions with Capt. Marshall in charge of the former and Capt. Oury in charge of the latter. As the latter work was already under way, the committee submitted a complete organization plan for the National Guard and National Army work, defining the duties and responsibilities of each of the departments needed therefor and recommending the personnel to head them. This organization plan was accepted by Col. Littell and promulgated as an office order on May 24.

This organization reported to the Cantonment Division chief. It consisted of an executive officer having under him four departments, viz, an engineering division, a materials division, a building or construction division, and an accounting division.

Shortly after this order went into effect Capt. Oury received another assignment and Capt. Marshall was made executive officer to the officer in charge of the Cantonment Division. His organization is dealt with under "Organization and methods adopted for emergency construction of cantonments and camps."

SECTION 10.

CONCEPTION AND ENGINEERING.

The method adopted by the committee on emergency construction and by the chief and division heads of the Cantonment Division for planning and constructing the cantonments was to form an organization, with headquarters in Washington, commanding the services of trained specialists, all chosen from civilian ranks. This organization, acting through the engineering division of the Cantonment Division, designed and made typical plans of cantonment and camp layout, water system, sewer system, and roads, which could be readily adapted and fitted to any site or topography. It also made typical plans for cantonment and camp barracks and quarters, lighting, heating, etc.

The building division of the Cantonment Division had supervisory and directing authority over the field forces.

The accounting division supplied, supervised, and directed the division auditors in charge of the field accounting.

The materials and transportation division, with the cooperation of the materials committees of the General Munitions Board, afterwards the War Industries Board, mobilized and expedited the delivery of a large proportion of the necessary materials.

The field work at each project was placed in charge of a constructing quartermaster, generally chosen for his past experience in civil construction operations, and who, with the advice and assistance of a civilian engineer or engineering concern, could adapt the typical plans to the needs of his particular project.

The work of this organization was greatly aided by the good team work and spirit of cooperation which was built up within it by its leaders. Special mention is due of the broad vision, knowledge of character, and good judgment shown by these men in the selection and placing of their subordinates.

In its work the Cantonment Division endeavored to help each of its departments to grasp and understand both its own functions and methods and those of every other department and bureau with which it dealt. Daily morning meetings of division heads were held with the chief of the division, at which the policies of the division, matters relating to internal and external relations and other construction

problems were solved with a minimum of misunderstandings and loss of time. Regular midday luncheon meetings by these men permitted further and informal discussions of current problems. The close association of these department heads, the intimacy with which they labored, their devotion to work, their unity of effort, and the marked absence of jealousies between them had an inspiring effect upon the remainder of the organization, which showed to an exceptional degree in enthusiasm and all-around good teamwork.

The Washington office worked day and night during the rush of building the cantonments, with two shifts of stenographers, and the department heads and other officers seldom left their desks before midnight.

Later, when its field of activities was expanded to include all Army construction work, semimonthly meetings of the entire division were held. At these, papers on methods, procedure, and other subjects of interest were read and discussed for the benefit and enlightenment of all. These were supplemented by the publication of a paper giving facts of interest concerning the policies of the division, the character and progress of projects, and the activities and personalities of many officers and civilians connected with it.

It would be difficult to find a better example of success attained by force of will and refusal to be stopped by seemingly insurmountable obstacles than the construction by the Cantonment Division, in the summer and fall of 1917, of the Army cantonments and camps.

SECTION 11.

ORGANIZATION AND METHODS ADOPTED FOR EMERGENCY CONSTRUCTION OF CANTONMENTS AND CAMPS.

OFFICE ORGANIZATION.

By office order of May 24, 1917, the organization and personnel undertaking the construction of the 16 National Army cantonments and undertaking on July 13 the construction of the 16 National Guard camps, were as follows:

Officer in charge of Cantonment Division: Col. I. W. Littell, United States Army.

Executive officer to the officer in charge: Capt. R. C. Marshall, jr., United States Army (rank later raised). In charge of all work pertaining to the 32 cantonments and camps for housing the National Guard and National Army.

Engineering officer: Maj. F. M. Gunby. In charge of the preparation of typical plans for buildings, water distribution, sewerage, drainage, electric distribution, tracks, roads, etc., also the deter-

mining and defining of requirements for laundries, incinerators, refrigerating plants, etc.

The designing and engineering division sections and their personnel were as follows:

Section.	In charge of—
Architecture.....	Maj. F. B. Wheaton.
General planning and drafting room.....	Mr. Geo. Gibbs, jr.
Water and sewer work.....	Mr. D. H. Maury.
Sewage disposal.....	Capt. L. S. Doten.
Water supply for fire protection.....	Mr. C. Goldsmith.
Heating and cooking.....	Capt. L. H. Tripp.
Electric work.....	Mr. A. L. Pearson.
Scheduling.....	Mr. E. R. Nichols.
Fire protection and prevention.....	Mr. W. M. Johnson.
Office assistant in charge of correspondence.....	Mr. B. W. Pond.

The work of the engineering division is dealt with later under "Plans and specifications."

Material officer: Maj. R. E. Hamilton. In charge of the purchase of all material, including power plants, refrigerating plants, pumping plants, building material and supplies. He was to cooperate with the various supply committees of the General Munitions Board and to work out with these committees the best methods of handling material and supplies. He also had charge of the inspection and expediting of material and equipment and the details of transportation from points of manufacture to the several cantonments and was to work out the requirements and make arrangements with the railroad association and the transportation committee of the General Munitions Board for the supply of cars.

The materials and transportation sections and their personnel were as follows:

Section.	In charge of—
Purchasing.....	Mr. E. C. Stockdale.
Expediting.....	Mr. F. W. Hatten.
Transportation.....	Mr. C. E. Denny.

Men were selected for the purchasing of various materials who were experts in their respective lines. They were largely drawn from important positions in commercial organizations. Some undertook this service for the Government without remuneration. A number afterwards accepted commissions and stayed in the Cantonment Division. Throughout the period when materials were being purchased for the construction of the cantonments and camps, dealings in all but a few instances were direct with the manufacturer or producer and not through Government agencies. The most notable exception was the lumber emergency bureau, which undertook the procurement of all necessary lumber. It fixed prices at less than the prevailing market prices.

For the inspection of materials and expediting of shipments experienced men were selected.

For handling transportation problems, the Secretary of the American Railway Association recommended Mr. Denny, who was appointed. He selected experienced railroad men for his subordinates and assistants.

Construction officer: Maj. M. J. Whitson (commissioned June 6, 1917). In charge of all field operations and the handling of matters arising between the Washington office and the contractors or between such office and the constructing quartermasters. He was to have six assistant constructing officers stationed in the Washington office, each having in his charge the work located in one geographical department of the Army, except that two were to be chosen for the Southern Department on account of the number of cantonments in that department. All communications from each geographical department were to come in over the desk of the proper assistant constructing officer. There were also to be six other assistant constructing officers who were later designated supervising constructing quartermasters and were assigned to act as field supervisors reporting to the central office, each to supervise certain projects, and to circulate only in his own territory.

Maj. Peter Junkersfeld, commissioned June 7, 1917, was selected by Maj. Whitson as his associate.

The Construction Division sections and personnel were as follows:

Mr. Ezra B. Whitman and Mr. H. E. Kabbon were selected as assistant constructing officers for the National Army cantonments.

Maj. J. N. Willcutt, Maj. Philander Betts, and Mr. H. C. Fernau were selected as assistant constructing officers for the National Guard camps.

Maj. Walter E. Denman, Maj. E. H. Abadie, and Maj. G. F. D. Trask were selected for supervising constructing quartermasters and assumed their duties in the latter part of July, 1917.

Accounting division.—Maj. W. A. Dempsey, in charge of accounting and legal matters. An accountant was to be chosen under his direction to handle all accounts and supervise the work of the accountants stationed at the various cantonments. This accountant was to be assisted by six auditors, each to cover a territory corresponding to that covered by one of the assistant constructing officers and to be in the field most of the time to supervise routine and accounting matters in the various field offices.

Maj. Evan Shelby was placed in charge of legal matters. He was to advise with all divisions of the office and to take every precaution to insure compliance with laws and regulations governing contracts, etc., with particular reference to matters involving the expenditure of funds. An insurance department as a branch of the

legal department was organized to look after the Government's interest in fire, accident, and workmen's compensation insurance. Capt. Herbert S. Wolfe was in charge of this department for about three months and was then succeeded by his brother, Mr. Leo J. Wolfe.

The contemplated plan above described for handling the accounting work was not followed. That actually used was developed as follows:

On May 30, 1917, the Secretary of War sent a memorandum to the Quartermaster General respecting certain irregularities in connection with lumber contracts for the Fort Oglethorpe cantonment, one of the Regular Army additions then under way in which he stated—

immediate and effective preparation to carry on the war is the paramount and first duty, and it is therefore proper to change our processes of contracting and adapt them to the necessity of the situation.

In so doing, however, the utmost care must be exercised so to establish the substituted processes that they will work economically and efficiently for the Government and deal with fairness and equality with the people. We have not time to make advertisements and cover the whole country with invitations to competitive bidding on the one hand, nor have we the right, on the other, to select a single source of supply and award it contracts without careful consideration of price.

The process which we have devised is the establishment of various committees subordinate to the Council of National Defense, composed of men having intimate and extensive knowledge of various lines of trade, which committees bring their knowledge to a common center, and on the basis of this systematized knowledge, advise the Quartermaster General who, through his subordinates, makes contracts in accordance with this advice. These contracts are, in the present instance, on the basis of cost plus a stipulated percentage of profits. * * *

In order, however, to have contracts of this kind work fairly, it is necessary that the elements entering into the cost of the work, including prices paid for materials and labor, shall be subject to the supervision of the owner, and a properly trained inspector or accountant representing the owner must have the right to supervise all elements entering into the cost upon which the contractor's percentage of profit is to be based. * * *

The American Institute of Accountants has offered its services to the Government. It has a permanent committee in Washington. In association with the Secretary of Commerce and certain other agencies assembled by him, the institute has placed at the disposal of the Government expert certified accountants, to aid us in the conduct of enterprises of this kind. I, therefore, direct:

(1) That the lumber committee be regarded as advisory and that the Quartermaster Department in no case regard itself as required to act upon the advice where such advice is either not in the best interest of the Government or will not extend the largest possible consideration to all vendors of material, consistent with the time limitations imposed.

(2) That all such contracts hereafter entered into be first referred to the accountancy committee for suggestions upon the form of a contract and for the inclusion of such safeguards as can be suggested.

(3) That, in the execution of such contract, there be appointed upon the recommendation of the accountancy committee, a representative of the Government to supervise the purchase of material and all other elements of cost entering into the execution of the contract. To the extent possible, these representatives of the Government should be officers of the Army in the Quartermaster Department either from

the active list or from the reserve officers corps; and where suitable persons are not thus available, they should, nevertheless, be employed for the work.

On June 9, in conformity with this direction, Col. Littell wrote the war committee of the American Institute of Accountants, which was also the accountancy committee of the General Munitions Board, quoting the last two paragraphs of the Secretary's directions, and requested that the accountancy committee recommend a representative to the Government for the purposes indicated.

On June 18, 1917, the General Munitions Board transmitted to Col. Littell the recommendation of its accountancy committee, which stated:

We recommend the appointment of Maj. W. A. Dempsey, Q. M. R. C., as the Government representative for the aforesaid duties, provided that he be directed to confer with the several division auditors who have been or who may be recommended by the accountancy committee of the General Munitions Board.

The division auditors who have been recommended to date are:

William H. West, 50 Pine Street, New York, N. Y.
Walter Mucklow, United States Trust Building, Jacksonville, Fla.
Albert G. Moss, 904 Praetorian Building, Dallas, Tex.
Charles Neville, National Bank Building, Savannah, Ga.
Page Lawrence, 830 Foster Building, Denver, Colo.
William Whitfield, 219 Oregon Building, Portland, Oreg.
Herbert M. Temple, Germania Life Building, St. Paul, Minn.
J. Porter Joplin, 122 South Michigan Boulevard, Chicago, Ill.
Charles E. Wermuth, 720 Hennen Building, New Orleans, La.
H. V. Robertson, Amarillo National Bank Building, Amarillo, Tex.
David E. Boyce, 120 Broadway, New York, N. Y.
William P. Hilton, Royster Building, Norfolk, Va.

The officer in charge of the Cantonment Division accepted these recommendations and appointed Maj. Dempsey as head of the accounting division of the Cantonment Division. There seems to be some doubt as to how much further, if any, the Secretary of War intended that the authority of the "representative of the Government" should extend. However, the officer in charge of the Cantonment Division also appointed Maj. Dempsey to act as the contracting officer, who was the official designated to sign construction contracts for the Government.

The accountancy committee immediately called together the above-mentioned division auditors, who assembled in Washington during the last week of May. They organized and proceeded to discuss the matters involved without knowing definitely what shape the emergency contract between the Government and the contractors would assume. The result was that these 12 accountants were appointed civilian division auditors in the Cantonment Division. To each of 11 of them was assigned the supervision of the accounting of two

or three camps; the twelfth, termed central auditor, was assigned to the Washington office to act as a medium of communication between the division auditors in the field and the Cantonment Division in Washington. The number of these auditors was subsequently increased to 18, and, by the middle of August, 1917, the accounting of 34 cantonments or camps (including 2 embarkation camps), was under the supervision of 17 division auditors.

The first work of the division auditors was to lay out a plan of organization and prepare a set of "instructions to field auditors." After revision by higher authority, this was issued early in June, 1917, as part of instructions to constructing quartermasters.

To the division auditors was assigned the task of procuring the necessary accounting forces. With the assistance of the war committee of the American Institute of Accountants, they selected the field auditor, 11 chief clerks, about 75 assistants, and the necessary stenographers, typists, messengers, telephone operators, etc., for each cantonment.

The duty of the division auditors, as set out in the "Instructions to field auditors" was to—

Superintend all accounting matters in their respective districts, each of which includes one or more cantonments. They appoint and direct all field auditors and their auditing staffs. They report weekly, and as much oftener as required, to the contracting officer, sending all communications in duplicate through the central auditor.

The duty of the central auditor was described as "one of the division auditors stationed at Washington and forms a channel of communication between the other division auditors and the various officials in Washington."

Mr. W. H. West was appointed central auditor.

The instructions to field auditors are dealt with under "Field organization."

FIELD ORGANIZATION.

The selection of constructing quartermasters was one of the most important duties of the building division of the Cantonment Division. These were necessarily recruited largely from civil life and were unfamiliar with the requirements and procedure of Army regulations and military law. Executive ability and general familiarity with construction and business methods were the desirable principal qualities. These were most frequently found in men of some engineering training, with considerable business experience and breadth of view.

Office order of May 24, 1917, provided the following field organization:

CONSTRUCTING QUARTERMASTER'S OFFICE.

Each constructing quartermaster will report to this office through one of the assistant construction officers outlined above. He should have an assistant who shall be a civil engineer, and under him will be whatever force of surveyors, draftsmen, etc., is needed by particular circumstances.

The constructing quartermaster will have the responsibility of adapting to the topographical conditions typical plans furnished by this office.

As outlined above he will have the assistance of civilian engineers in the planning of water supply, sewage disposal and, if he requires other help, he should promptly notify this office of such requirements. It will probably be better to retain civilian civil engineers or civil engineering concerns rather than to attempt to build up a considerable field force to work under his personal direction. * * *

The conditions in various cantonments will differ, and matters of this kind will have to be left largely to the judgment of the constructing quartermaster to be decided for each cantonment on its own merits after consulting with this office.

The theory of the field organization should be to use the contractors' organizations as far as possible for the field work required and for any engineering details.

Decentralization of authority in order to secure speed was the main feature of this organization, and under it the duties of the central office at Washington were principally those of furnishing typical plans and advising upon and supervising the work of construction and accounting. The authority of the constructing quartermaster on the site was almost supreme. He was limited only by advisory general instructions from the central office.

INSTRUCTIONS TO CONSTRUCTING QUARTERMASTERS.

For the better understanding of its requirements and procedure, on June 18, 1917, the Washington office issued, in mimeographed form, Instructions to Constructing Quartermasters. This, together with oral explanations and instructions, were usually given to the constructing quartermaster in Washington, where he reported before proceeding to his work. He was also given the revised Manual for the Quartermaster Corps, United States Army, and a Compilation of Laws Relating to the Quartermaster Corps.

A few of the important provisions in the instructions were:

Carry to completion the buildings designated as barracks, which include kitchen and mess facilities, lavatories, officers' quarters, and storehouses.

Simultaneously with the above construction, carry to completion the water system, and, where designated, the sewer system.

All buildings not included in the section above will not be commenced until the barracks and mess facilities are completed, or until further orders relating thereto have issued from this office.

Such roads and railroad sidings as are absolutely necessary to carry out the building program as above will be undertaken at once, their extent and cost to be reported to this office at the earliest possible date.

The constructing quartermaster will carefully examine the orders for material submitted by the contractor, and will see that the rates of delivery specified are not in excess of the capacity of the contractor to unload and utilize in the work.

The Chief of Staff directs that the artillery barracks, stables, and miscellaneous buildings pertaining thereto, be not undertaken until the last item of construction, or until further orders issue from this office, as it is possible that a change in program relating to the artillery may be put into effect. It is believed that space should be left for them, as this will form a firebreak in case the artillery is removed.

PERSONNEL.

There will be assigned to duty, with each constructing quartermaster, one consulting engineer and one expert water and sewer engineer, if found necessary. The constructing quartermaster will use these as a nucleus of his engineer force, and utilize to the fullest extent the engineering force of the contractor. Should the engineering force of the contractor prove inadequate, he will add assistance to his own force as needed.

There will likewise be assigned to duty, under the constructing quartermaster, one auditor or chief accountant for each cantonment. The chief accountant will be responsible under the constructing quartermaster's orders for the necessary accounting staff, and will call on the constructing quartermaster for the necessary assistants.

MATERIAL AND EQUIPMENT.

When the construction contract is signed, this office will furnish the constructing quartermaster concerned a statement showing the materials located by the Government and the dealers from whom these materials should be purchased by the contractor. This statement will show the quantity of material each dealer can furnish, the price, and the rate of delivery.

It will be necessary for the contractor in most instances to furnish small tools and machinery equipment required for the work. The conditions under which these purchases are to be made are defined in the contract.

It is not probable that the materials located by the Government will cover all the requirements necessary for complete construction of the cantonment. The constructing quartermaster and the contractor will go over the list of requirements and approval should be given for the purchase by the contractor of all material, small tools, and equipment not provided by the Government, and for such material as may be necessary and available in the local markets for the conduct of the contractor's early operation prior to the arrival of material ordered on regular schedule in connection with cantonment construction. It will be necessary at all times that the contractor be given every assistance calculated to expedite his work and to relieve him from hampering restrictions of any sort.

TRANSPORTATION.

The contractor will furnish certificates to the constructing quartermaster showing—

1. Kind of material.
2. Approximate number and classes of cars required.
3. Approximate dates on which cars are required.
4. Point of shipment.
5. Destination.

The constructing quartermaster will forward two copies of each statement to the Washington office. One of these copies will be filed with the commission on car service of the American Railway Association, for its advance information as to car requirements.

GUARD DUTY.

As soon as the cantonment site is selected, and the constructing quartermaster is assigned, a military unit will be sent to the site to guard the camp. The guard will be disposed by the officer in command, in accordance with the necessities, as indicated by the constructing quartermaster. In cases where circumstances prevent the assignment of a military unit for police duty, this matter will be arranged as directed by the construction officer.

HOSPITAL AND MEDICAL SERVICES.

The contractor must provide his own hospital and medical services. When a military unit is assigned to a cantonment for guard duty, medical and hospital services will be provided for the guard.

CONTRACTOR'S QUARTERS.

During the construction of the cantonment buildings, the constructing quartermaster at each place is instructed to permit the contractor to house his men in the barracks as constructed for one regiment except, of course, such men as the constructing quartermaster might deem to be unfit to be so housed, such to be placed in buildings built especially for them.

The constructing quartermaster is further instructed, upon the contractor's men vacating buildings they have occupied, to have the building thoroughly cleansed and fumigated by the contractor, under the direction of a medical officer of the Army.

FIRE PROTECTION.

The contractor should provide fire protection for material stored on the cantonment site and for completed work during the period of construction. Prior to the development of the general water supply for the cantonment, the constructing quartermaster and the contractor should decide on the most feasible method of protection with the means at hand, which should be put into effect promptly, and continued until no further use for it exists.

SUPPLIES.

The constructing quartermaster will secure the necessary supplies for carrying on the work as necessity arises.

There is assigned to each cantonment an officer of the Regular Army, and he, or an assistant, will be in charge. This assignment has been made with a view to utilizing his services in looking after the military and administrative end of this construction.

The last was interpreted to refer to the divisional commanders who were early assigned to duty at the various cantonments and camps.

The constructing quartermasters selected their principal assistants with the approval of the Washington office.

Tables 3 and 4 give the names of the cantonments and camps, their location, the names of the constructing quartermasters, the dates when they reported at their field stations, the name of the contractor and the date when work started.

TABLE 3.—*National Army cantonments.*

Name.	Location.	Constructing quartermaster.	Date reported field station.	Contractor.	Date work started.
Camp Pike.....	Little Rock, Ark...	Maj. E. R. Fordyce, E. R. C.	1917. May 24	Jas. Stewart Co....	1917. June 17
Camp Devens.....	Ayer, Mass.....	Capt. E. Canfield, R. A., Q. M. C.	June 8	F. T. Ley & Co.....	Do.
Camp Travis.....	Fort Sam Houston, Tex.	Capt. G. E. Thorne, R. A., Q. M. C.	June 14	Stone & Webster...	June 14
Camp Dix.....	Wrightstown, N. J.	Capt. H. C. Williams, R. A., Q. M. C.	June 12	Irwin & Leighton...	June 12
Do.....	do.....	Capt. T. H. Skinner, Q. M. R. C.	June 21	do.....	
Camp Gordon.....	Atlanta, Ga.....	Maj. J. N. Pease, Q. M. R. C.	June 14	Arthur Tufts Co....	June 18
Camp Funston.....	Fort Riley, Kans...	Capt. F. J. Herman, R. A., Q. M. C.	June 16	Geo. A. Fuller Co..	June 1
Camp Grant.....	Rockford, Ill.....	Maj. D. H. Sawyer, Q. M. R. C.	do.....	Bates & Rogers Co..	June 6
Camp Custer.....	Battle Creek, Mich.	Maj. E. B. Morden, Q. M. R. C.	June 22	Porter Bros.....	June 19
Camp Dodge.....	Des Moines, Iowa...	Maj. M. A. Butler, Q. M. R. C.	June 6	Chas. Weitz' Sons..	Do.
Camp Taylor.....	Louisville, Ky.....	Maj. F. E. Lamphere, Q. M. R. C.	June 20	Mason & Hangar...	June 22
Camp Jackson.....	Columbia, S. C.....	Maj. Wm. Couper, Q. M. R. C.	June 17	Hardaway Construction Co.	June 15
Camp Lewis.....	American Lake, Wash.	Capt. D. L. Stone, R. A., Q. M. C.	June 21	Hurley-Mason & Co.	June 14
Camp Upton.....	Yaphank, L. I.....	Maj. O'K. Myers, Q. M. R. C.	do.....	Thompson-Sterrett Co.	June 21
Camp Sherman.....	Chillicothe, Ohio...	Capt. W. S. Rhodes, Q. M. R. C.	June 22	A. Bentley & Sons Co.	July 6
Do.....	do.....	Capt. Ward Dabney, R. A., Q. M. C.	July 5	do.....	
Camp Meade.....	Annapolis Junction, Md.	Maj. R. F. Proctor, Q. M. R. C.	June 25	Smith Hauser & McIsaacs.	July 2
Camp Lee.....	Petersburg, Va.....	Maj. F. B. Edwards, R. A., Q. M. C.	June 29	Rhinehart & Dennis Co.	June 20
Do.....	do.....	Maj. E. K. Coe, E. R. C.	Aug. 5	do.....	
Do.....	do.....	Maj. E. H. Abadie, E. R. C.	Sept. 1	do.....	

TABLE 4.—*National Guard camps.*

Name.	Location.	Constructing quartermaster	Date reported field station.	Contractor.	Date work started.
Camp Hancock...	Augusta, Ga.....	Maj. G. B. Strickler.	1917. July 25	T. O. Brown & Co..	1917. July 19
Camp Cody.....	Deming, N. Mex....	Maj. C. H. Miller.	July 20	J. W. Thompson....	July 20
Camp Sheridan...	Montgomery, Ala...	Maj. A. W. Reynolds..	July 12	A. Blair.....	Do.
Camp Wadsworth	Spartanburg, S. C..	Lieut. Col. J. D. Kilpatrick.	July 13	Fisk-Carter Construction Co.	July 19
Camp MacArthur.	Waco, Tex.....	Maj. M. Hanson.....	July 14	Fred A. Stone Construction Co.	July 20
Camp McClellan.	Anniston, Ala.....	Maj. C. L. Dulin.....	July 28	J. O. Chisolm & Co.	Do.
Camp Greene.....	Charlotte, N. C....	Maj. C. H. Greene....	July 15	Consolidated Engineering Co.	Do.
Camp Logan.....	Houston, Tex.....	Capt. W. P. Rothrock.	July 28	American Construction Co.	July 24
Camp Sevier.....	Greenville, S. C...	Maj. A. C. Doyle.....	July 13	Gallivan Building Co.	July 16
Camp Fremont...	Palo Alto, Calif...	Capt. W. Fleishbauer.	July 17	Lindgren & Co.....	July 24
Do.....	do.....	Capt. J. B. Chaffey.	do.....	do.....	
Camp Doniphan..	Fort Sill, Okla...	Lieut. Col. G. D. Guyer, R. A.	Aug. 15	Selden-Breck Construction Co.	July 25
Camp Bowie.....	Fort Worth, Tex...	Capt. H. S. Baker....	July 21	J. W. Thompson...	July 24
Camp Kearney...	Linda Vista, Calif.	Maj. C. H. Nichols....	Aug. 11	W. E. Hampton & Co.	July 23
Camp Wheeler...	Macon, Ga.....	Maj. W. L. Henwood..	July 22	W. Z. Williams Co. (Inc.).	July 18
Camp Shelby.....	Hattiesburg, Miss..	Maj. W. J. Howard...	July 20	T. S. Moudy.....	July 21
Camp Beauregard.	Alexandria, La....	Maj. A. M. Shaw.....	July 24	Stewart-McGee Construction Co.	July 23

INSTRUCTIONS TO FIELD AUDITORS.

The work of the field auditor, as given in the original Instructions to Field Auditors, was, in part, as follows:

Each field auditor will be in charge of all accounting matters at the cantonment where he is stationed and will be responsible for the carrying out of the provisions of the contract relating thereto. He will report to and take all instructions from his division auditor, and also work in harmony with the constructing quartermaster and contractor. He will be in charge of all the accounting staff, including clerks, stenographers, timekeepers, checkers, and all other employees engaged by him and connected with matters relating to the accounts.

The system of accounting established in the instructions to field auditors was specific as to many details and more or less general in others. It was a sufficient guide in the hands of experienced accountants for keeping proper accounts.

The system covered:

- (a) The manner in which contracts and orders were to be handled.
- (b) The checking of material by the receiving clerk, whether a complete or partial shipment.
- (c) The inspection of material.
- (d) The recording of the shipments received with necessary data.
- (e) The filing of information obtained in (a), (b), (c), and (d) by attaching to duplicate bill for material.
- (f) Contra charges for damaged goods and deductions for shortages.
- (g) Proper handling of duplicate invoices, the original being retained by contractor until claim made for reimbursement.
- (h) The handling of contractors' bills against the Government for—
 - Material purchased.
 - Material or supplies furnished.
 - Rental of equipment.
 - Fees.
- (j) Keeping the records, etc., as follows:
 - Voucher record for bills from contractors.
 - Voucher record for purchases made direct by the Government.
 - Register of checks.
- (k) Handling of miscellaneous disbursements, liability, insurance, etc.
- (l) Sale of scrap or other material.
- (m) Handling of freight bills.
- (n) Payment to contractors.

TIMEKEEPING AND CHECKING.

The instructions to field auditors provided for the proper keeping and checking of time and for the handling of—

- Employment cards.
- Change cards.
- Discharge cards.
- Numbered brass checks.
- Check board or daily time cards.
- Time record and time checking record.
- Labor classification.
- Pay rolls (the making up and checking of same).
- Paying off of men.

As previously mentioned the original instructions were general. Each division and field auditor carried out the general instructions as seemed best to him, with the result that the system varied, although its main principles apparently were followed.

PROPERTY ACCOUNTABILITY.

This was dealt with in the instructions to field auditors. Property was handled as provided for in the Quartermaster's Manual in use in the Quartermaster General's office.

COST.

This was treated in the instructions to field auditors under the title "Classification of disbursements." The classification of expenditures were given in section 5 in use in the Quartermaster General's office, namely:

- Barracks and quarters.
- Supplies service and transportation.
- Roads, walks, wharves, and drainage.
- Construction and repair of hospitals.
- Shooting galleries and ranges.

These were subdivided in accordance with Article II, sections (a) to (j), inclusive, of the Contract for Emergency Work, under which the construction was proceeding.

Tables 5 and 6 give the names of the cantonments and camps and the division auditors and the field auditors assigned thereto.

TABLE 5.—*National Army cantonments.*

Cantonment.	Field auditor.	Division auditor.
Devens.....	James F. Rollins.....	Robert Douglass.
Upton.....	A. B. Pillon.....	David E. Boyce.
Dix.....	W. P. Elliott.....	Do.
Meade.....	E. L. Hatten.....	W. P. Hilton.
Lee.....	E. A. Leitch.....	Do.
Jackson.....	A. T. Holmes.....	Charles Neville.
Gordon.....	S. J. Hayles.....	Walter Mucklow.
Sherman.....	S. G. Rusk.....	Page Lawrence.
Taylor.....	A. M. Trader.....	Do.
Custer.....	T. W. Betak.....	J. Porter Joplin.
Grant.....	Edward B. McQuinn.....	Do.
Pike.....	Charles F. Bridwell.....	A. G. Moss.
Dodge.....	John Mahony.....	Herbert M. Temple.
Funston.....	H. S. Drake.....	Do.
Travis.....	Charles D. Block.....	Charles E. Wermuth.
Lewis.....	H. E. Smith.....	Wm. Whitfield.

TABLE 6.—*National Guard camps.*

Camp	Field auditor.	Division auditor.
Green.....	J. P. McDonald.....	Charles Neville.
Wadsworth.....	T. W. Glaze.....	Do.
Hancock.....	H. F. Owens.....	Do.
McClellan.....	F. C. Horton.....	Walter Mucklow.
Sevier.....	S. G. Sinden.....	Charles Neville.
Wheeler.....	Tracey S. Newton.....	Walter Mucklow.
MacArthur.....	A. A. Hart.....	Marion Douglass.
Logan.....	G. H. Rathe.....	Charles E. Wermuth.
Cody.....	J. Henry Wood.....	W. P. Musaus.
Doniphan.....	H. C. Crane.....	H. V. Robertson.
Bowie.....	Charles Rowden.....	E. J. Archinard.
Sheridan.....	L. S. Betty.....	G. G. Trost.
Shelby.....	A. G. Moffat.....	Charles E. Wermuth.
Beauregard.....	E. F. Hunter.....	A. G. Moss.
Kearney.....	W. D. Ballantine.....	W. P. Musaus.
Fremont.....	H. E. Nowell.....	Wm. Whitfield.

SUPERVISING ENGINEERS.

Office order dated May 24, 1917, stated that the engineering officer—will secure the services of consulting engineers to do all the engineering involved in water supply and sewage disposal, as this is work which must be done in the field. It may be necessary to call on engineering concerns for help on some of the other engineering details, and in case this is necessary my approval shall be obtained before any action is taken.

The intention was to place the field engineering in the hands of competent engineers or engineering concerns. The sites had not been determined at this time and it was foreseen that much of the engineering would have to be done after construction had been started.

The method of selection and employment of these engineers was placed by the committee on emergency construction in the hands of its subcommittee on engineering, with the addition of Mr. L. B. Stillwell. On June 19, 1917, the subcommittee reported in part as follows:

The engineering work at individual cantonments may be done in one of three ways, viz:

1. By the employment of existing engineering organizations with competent staffs capable of ready expansion.
2. By the organization of the entire local engineering force de novo, every job to be done under the immediate supervision, rather than direction, of the constructing quartermaster.
3. By a combination of methods (1) and (2) suggested above; that is, by the organization of a local engineering force under the direction of the constructing quartermaster and supplemented by the employment of existing engineering organizations upon special branches of the work.

The report recommended the first plan as the best and cheapest, because it would save time for organization, promote increased efficiency, and allow existing engineering organizations to be strengthened rather than impaired, to the advantage of the country.

In most cases the recommendation of the subcommittee that an engineering firm should provide all of the engineering services for one cantonment was adopted by the constructing quartermasters. Both

of the other methods suggested by the committee were also used. The success obtained depended more upon the ability of the individual or firm employed and on the personality and experience of the constructing quartermaster than on the method used. The supervising engineers were, in most cases, the engineers or firms who had made the preliminary surveys of the respective sites and were familiar with local conditions. The full report of the subcommittee on engineering of the committee on emergency construction, dated June 19, 1917, with copy of each of the three contract forms which it submitted with its report, will be found in annexed Exhibit No. 4.

At the suggestion of the committee on emergency construction, it was decided to utilize the services of expert town planners to assist in adapting the typical plans to the topography at the National Army cantonment sites. These experts were selected by the subcommittee and were among the first upon the ground.

Tables 7 and 8 give the names of the cantonments and camps and of the supervising engineers and town planners employed. The latter were not used on the National Guard camps.

TABLE 7.—*National Army cantonments.*

Cantonment.	Supervising engineers.	Town planners.
Devons.....	Frank A. Barhour.....	H. J. Kellaway.
Upton.....	Walter E. Spear.....	
	Frank Sutton.....	
	Walter S. Timmiss.....	
	Bertrand H. Wait.....	
Dix.....	Capt. Theodore H. Skinner.....	Owen Brainard. J. L. Greenleaf. Richard Schermerhorn, jr. Charles N. Lowrie.
	Hazen, Whipple & Fuller.....	
Meade.....	Morris Knowles.....	
Lee.....	Allen Saville.....	
Jackson.....	P. H. Norcross.....	
Gordon.....	Lockwood, Greene & Co.....	H. P. Kelsey. Thomas W. Sears. E. H. Bennett. L. V. Sheridan. Robert Wheelwright. J. S. Pray & S. Herbert Hare. George E. Kessler. Carl F. Pilat.
Sherman.....	R. Winthrop Pratt.....	
Taylor.....	James B. Wilson.....	
Custer.....	Samuel A. Greeley.....	
Grant.....	Alvord and Burdick.....	
Pike.....	Black & Veach.....	
Dodge.....	A. D. Leach.....	
Funston.....	Wynkoop Kiersted.....	
Travis.....	E. N. Noyes.....	
Lewis.....	William J. Roberts.....	

TABLE 8.—*National Guard camps.*

Camp.	Supervising engineers.	Town planners.
Green.....	J. L. Ludlow.....	
Wadsworth.....	J. E. Sirrime.....	
Hancock.....	Nesbit Wingfield.....	
McClellan.....	Morris Knowles.....	
Sevier.....	J. E. Sirrime.....	
Wheeler.....	G. R. Solomon.....	
MacArthur.....	J. B. Hawley.....	
Logan.....	H. E. Sands.....	
Cody.....	Black & Veach.....	
Doniphan.....	Black & Veach.....	
Bowie.....	F. J. Van Zuben.....	
Sheridan.....	G. G. Earle.....	
Shelby.....	Twombly & Hemphill.....	
Beauregard.....	W. R. Goss.....	
Kearney.....	Louis C. Hill.....	
Fremont.....	G. A. Elliott.....	

CONTRACTORS' ORGANIZATIONS.

The character of the organization used by different contractors doing war emergency construction varied according to the personnel and practice of each concern. The following is a description of the methods and procedure generally adopted.

One of the principals of the contracting concern, usually an official, partner or manager, was in charge as chief executive. Under him the work was divided into four or five departments, of which the principal one, the building department, was usually in charge of a general superintendent. This department was divided into numerous construction branches, each of which was usually subdivided into sections, often formed according to territory, area, or character of work. Each of these was in charge of a superintendent who was responsible for the bosses and gang foremen who had direct charge of the workmen.

In the building department there was usually a subcontracts branch which supervised the subcontractors. It was the policy of the Cantonment Division to discourage the general contractor from undertaking to perform those portions of the work for which he was not properly qualified and to encourage him to use subcontractors in trades requiring special knowledge and equipment. These usually comprised plumbing, heating, electric work, and road construction.

Engineering, administrative, purchasing, and accounting departments usually operated in parallel with the building department.

On some operations the time-keeping and pay rolls were kept entirely by the contractor's organization, and on others this work was taken over in part or whole and handled by the Government.

The contractors did not generally at first appreciate the importance of keeping the time records and supporting receipts for wages in accordance with Government requirements. They often failed to realize, until work was well under way, the great amount of clerical labor needed in handling pay rolls for 8,000 to 14,000 men on rush work.

The contractors and the field auditors had difficulty in holding sufficient clerical help, as the wages, including overtime, paid to mechanics were greater than could be paid under Government regulations to clerks. Many clerks consequently resigned and went into field work.

In constructing the original cantonments and camps the contractors' organizations had to be expanded to such extent that proper supervision was difficult. It was often necessary to increase these organizations in a few days to many times their former size. The efficiency of such an organization, using scattered groups of workmen, depends on the number and ability of its superintendents, foremen,

and gang bosses. It was often necessary to use some foremen who had never been employed by the contractor and knew little of his methods or those of his superintendents. The proper balancing of crews, especially during the first few weeks, also proved very difficult.

The unloading and distributing of material from railroad cars in such manner as to keep the various forces actively employed required facilities and talent that were seldom securable. If men were laid off when sufficient material was not available to push the work as desired, they could not be obtained later when needed. These difficulties, seldom entirely avoidable, caused loss of output without reduction of pay roll. This work had to be made up later, often at extra cost from overtime. They also afforded opportunities for shirking and tended to cause labor inefficiency. It is a fact that, by the method adopted, the cantonments were completed in time for the troops, and no other method is known by which this result could have been accomplished. Expressed in dollars the excess labor costs were large, but they were negligible compared to the losses which might have been caused by a delay in housing, training, and shipping of the troops.

The successful conduct of the war depended largely upon speed in cantonment construction. As in combat work, the only way to win success was to have a large force at hand. In order to rush construction this had to be large enough to take full advantage of favorable conditions of weather and delivery of materials. Under these conditions there was often necessarily a surplus of labor on the pay roll. Underload of this character, and the other causes already mentioned, which applied to nearly all war construction, impaired labor efficiency, lowered the average output per man hour, and caused a correspondingly high labor cost per unit of finished work. These conditions appear to have developed in the war work of every nation and to be generally inseparable from it.

The conclusion of the Board of Review is that the value of the method and results used on cantonment and camp construction can not be measured in dollars or in unit costs but must largely be gauged by the usual test of Army work, success or failure. In this case all evidence obtained indicates that they achieved a degree of success much beyond that anticipated.

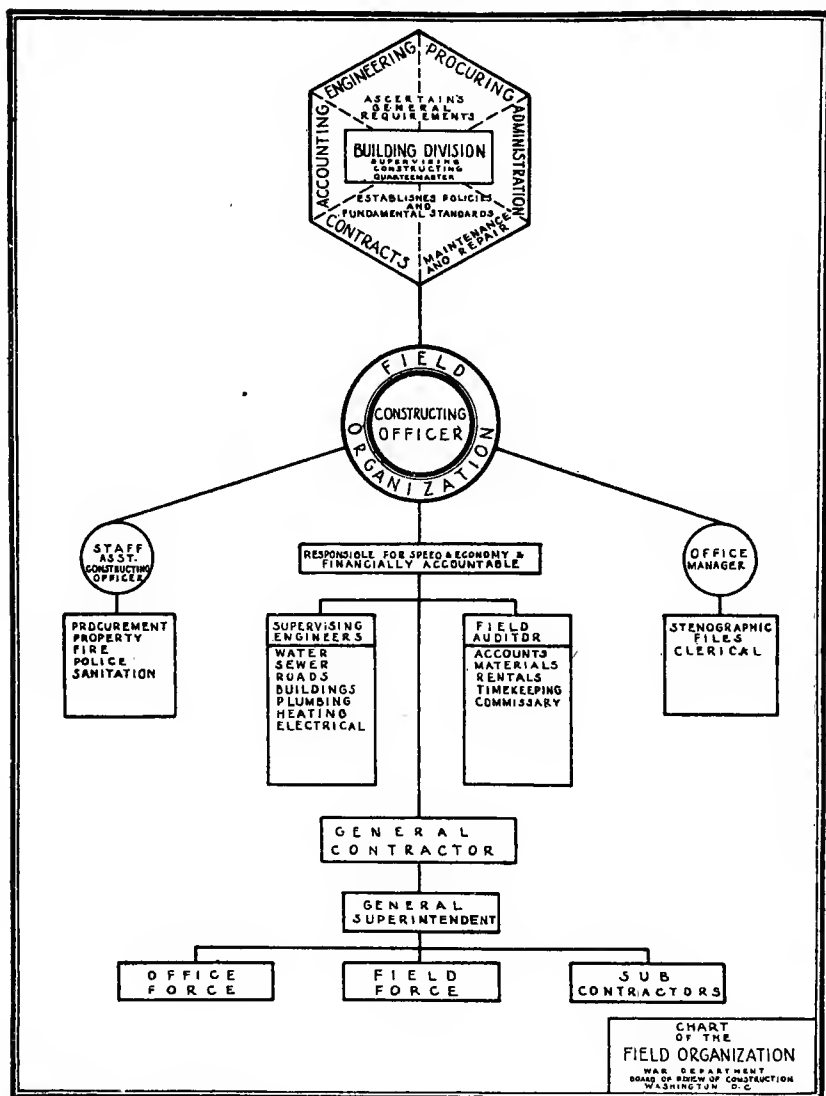
A chart of the field organization is given on the following page.

PRELIMINARY ESTIMATES OF COST, APPROPRIATIONS, AND COMMENCEMENT OF WORK.

Before the United States entered the war the construction and repair division of the Quartermaster Corps had prepared cost estimates of housing the new Army, and the Army deficiency bill, then

before Congress, carried an appropriation of \$78,000,000, of which \$6,000,000 was for building training camps and new barracks at various Army posts.

An estimate prepared on March 13, 1917, based on the experience in housing the National Guard on the Mexican border in 1916, showed



a cost at the rate of \$72.229 per man. This estimate did not include sewerage systems or any water-supply systems except facilities for distributing water to certain points among the buildings, nor many other items which were later supplied. The estimates for barracks and quarters provided in general for housing the men under canvas.

In making the foregoing estimates no allowance was made for the fact that in 1916 the guardsmen did most of the work of flooring tents, building latrines, etc., that no adequate record had been kept of labor and material, and that several of the items included as construction costs were properly chargeable to service and maintenance.

An estimate prepared on May 26, 1917, based on then current costs and covering apparently adequate facilities for the housing, water supply, sewerage, lighting, roads, hospitals, and other items of a cantonment showed a cost of \$174.35 per man.

The following table gives a comparison of the estimates of March 13, 1917, and May 26, 1917:

TABLE No. 9.

Barracks and quarters.	Estimate of Mar. 13, 1917, per man.	Estimate of May 26, 1917, per man.
Construction.....	\$42.00	\$61.98
Wall boarding.....		3.47
Screening and screen doors.....		2.54
Rental of camp site.....	2.00	.31
Rental of recreation stations.....	1.184	
Rental of lodgings.....	.92	
Allowance for contingencies, 10 per cent.....		6.83
Supplies, services, and transportation.....		7.75
Plumbing.....		9.31
Heating, stoves.....		
Heating, steam.....		3.10
Power plant.....		2.79
Electric lighting, interior.....		.68
Electric lighting, exterior (camp limits).....	1.75	6.26
Water system.....		2.32
Sewer system.....		
Maintenance, water and sewer systems.....	.175	6.21
Sewage disposal.....		6.33
Laundry.....		1.39
Fire apparatus, including buildings.....		.77
Garbage incinerator plant.....		3.87
Ice and refrigerating plant.....		4.18
Bunks.....		5.43
Mattresses.....		.62
Ranges.....		.62
Refrigerators.....		6.17
Allowance for contingencies, 10 per cent.....		
Toilet paper.....	2.00	
Garbage disposal.....	3.00	
Purchasing water.....	4.80	
Electric current.....	4.80	
Roads, walks, wharves, and drainage.....		5.43
Roads.....		.93
Drainage.....	5.00	.62
Clearing.....		2.33
Railroads.....		
Maintenance, roads.....	.50	
Allowance for contingencies, 10 per cent.....		.93
Construction and repair of hospitals.....	2.10	118.92
Shooting galleries and ranges.....	2.00	2.26
Total cost per man.....	72.229	174.35
Total number men.....	1,051,270	1,103,496
Total estimate cost.....	\$78,365,798.75	\$192,393,200

¹ Estimate of Medical Department of Army.

It is clear, from the foregoing, that the appropriation of \$78,000,000 could not provide for housing the then contemplated Army and that according to the estimate of May 26, 1917, \$192,000,000 was needed.

As the construction of all 32 cantonments and camps at one time would apparently cause a great strain on the material and labor resources and transportation facilities of the country, the Secretary of War decided, May 29, 1917, that the construction of cantonments with wooden barracks be then commenced at 16 National Army sites only and that the estimate of May 26, 1917, be approved except that—

fly screens (except for kitchen and mess halls), refrigerating and ice plants be omitted, and that hospitals be reduced to provide accommodations for the sick on a 3 per cent basis instead of on a 5 per cent basis as recommended by the Medical Department.

Other economies where practicable were to be made.

On June 15, 1917, the appropriation bill became a law. It should be noted that, until this bill became effective, the Cantonment Division, on account of lack of funds, had to rely almost entirely on voluntary civilian aid.

On June 28 the department commanders were notified of the cancellation of previous orders to the effect that "National Guard divisions in the North would not be sent South this summer," and were directed to complete leases for National Guard camp sites already selected.

On July 13 The Adjutant General of the Army was notified by the Acting Chief of Staff that the Secretary of War directed the department commanders to expedite the leasing of National Guard divisional training camp sites and that all construction necessary for occupancy be carried forward as soon as possible.

The preparation of these National Guard camps was, by this order of July 13, to consist of clearing ground, laying out camps, establishing such roads and railroad sidings as might be necessary for the reception of the troops and for carrying out the building program outlined, namely, installing the necessary water, sewerage, and drainage systems; building the required storehouses, kitchens, mess shelters, latrines, and shower baths; constructing the auxiliary remount depots called for in the approved plan; and issuing to the organization of the National Guard the additional tentage necessary to equip them completely for their authorized strength.

On May 31 the sites for two of the 16 National Army cantonments were approved. The remainder of these sites were approved between that date and June 22. The first three contracts for construction were executed on June 11, and the last three on June 23, 1917.

The dates of approval of sites, execution of contracts, and commencement of actual work at the National Army cantonments and National Guard camps are given in the section on "Progress of cantonment and camp construction."

PLANS AND SPECIFICATIONS.

CANTONMENT AND CAMP PLANS.

The engineering division was handicapped in the preparation of the needed cantonment and camp plans by lack of data respecting the sites and by postponement of the decision as to the ultimate size of the standard company unit. These company units in the United States Army were then quite different from those of the European armies. The sizes of the multiples of the standard company unit to form battalions, regiments, brigades, and divisions were also subject to the same uncertainty pending receipt, by the General Staff, of recommendations from Gen. Pershing, who reached Europe on June 15, 1917.

It was, however, essential that these plans be advanced to a point where construction could begin at the earliest possible date and to provide such flexibility therein as would permit of later adjustment to suit the standard Army units when recommended by Gen. Pershing.

Typical layouts were made for the different units—i. e., Infantry, Cavalry, Artillery, etc.—which could be combined to meet the requirements of any cantonment.

Two standard types of cantonment were laid out—one with its elements lying in a straight line and the other in the shape of the letter “U.” Instructions were given to adhere to these layouts and to allow plenty of room for expansion wherever practicable.

BUILDINGS.

Prior to the war the advisory architect of the construction and repair department of the Quartermaster Corps had made a study of various types of barrack buildings. A set of plans for mobilization camps had been completed in April, 1914, using as a unit an infantry regiment of 3 battalions comprising 12 companies of 141 men each. These plans included barracks for housing officers and men, mess buildings, storehouses, administration buildings, guardhouses, post exchanges, hospitals, kitchens, latrines, bathhouses, field bakeries, and shelters for animals and vehicles.

Several groups of various kinds of buildings had been erected at Fort Myer, Va., namely, ready-cut type, sectional wood type, sectional steel type, concrete on wire lath, and one group built in the usual way. Records kept of the cost and time required for construction of these buildings showed that the ordinary type of wooden building, constructed by cutting, framing, and erecting material on the site, was cheaper and could be completed in slightly less time than the other types.

Up to this time all Army barracks had been one-story buildings. Study of the problem, however, showed that a two-story building

would effect economy in land and cost of improvements, such as roads, sewers, water mains, etc.; also that such barracks had proved satisfactory for the housing of troops in Canada. The two-story barrack was thereupon adopted.

A new set of plans was prepared and issued in May, 1917. In these the construction of exterior walls differed for buildings for northern and southern sites. For so-called northern construction the studding of the exterior walls was covered on the outside with one-ply roofing felt and then with drop or novelty siding, and on the inside with tongued and grooved sheathing for a height of about 5 feet from floor, above which the walls were covered with wall board. For so-called southern construction the studding was covered on the outside with sheathing, one-ply roofing felt, and novelty or drop siding, and no covering was used on the inside.

In August, 1917, the new Army organization known as The "Pershing Division" was effected. This changed the company unit from 150 men to 250 men. This created a difficult problem, as many barracks in the various cantonments were already completed on the former basis. It was finally solved by housing two companies, of 250 men each, in three barracks. The barracks built for 150 men each were planned to accommodate 100 men on the second floor and 50 men on the first floor. The other half of the first floor was to be used as a mess hall. By omitting the mess hall in one of the three buildings and placing 100 men on its first floor the three barracks were made to accommodate 500 men or two companies, and a company mess hall was provided in each of the two other buildings.

The Surgeon General's Office then concluded to decrease the possibility of contagion by increasing the cubic space per man and by dividing the men into smaller groups. A 66-man barrack, four of which are necessary to house a company of 250 men and a separate mess hall, was designed which later became the standard barrack. These changes increased the cost of the cantonments but seem to have been made economically and without discommoding the troops.

The Board of Review considers it essential to give here the following data relating to the utility services and other facilities provided for the sanitation, health, and comfort of the troops.

WATER SUPPLY.

One important point to be determined in the design of the water-works system for the National Army cantonments was the volume required. Conditions which affected the problem were the desire to provide an ample supply for every reasonable requirement, including both domestic use and fire protection; the urgent need of haste; the limited appropriations; and the large quantities of material and labor required for the simultaneous construction of 16 cantonments.

With the approval of the subcommittee on engineering of the committee on emergency construction of the General Munitions Board, and of the representatives of the National Board of Fire Underwriters, a daily allowance of 55 gallons per capita was fixed. It was expected that some leakage would occur but that waste could be largely controlled by military discipline and proper rules. This allowance provided 50 gallons daily per man and 15 gallons daily per animal, assuming one animal for every three men. This allowance of water is about 80 per cent more than the average supplied to the British, French, Belgian, Canadian, or German cantonments. There are many cities in the United States where the per capita daily consumption averages less than 50 gallons, including all leakage, waste, sewer, flushing, sprinkling, and other uses.

On account of the extensive use of wood-stave pipe the maximum pressure in the mains was fixed at 85 pounds per square inch. The minimum pressure was fixed at 60 pounds per square inch.

Typical plans for the layout of water mains were supplied, with specifications allowing flexibility in order to meet topographical and other local conditions. The location of mains, hydrants, and service pipes in each military unit and the size of service pipes to each building were, however, fixed, and sizes of mains were prescribed for any condition which could reasonably be anticipated. None of the buildings was more than two stories high. On account of the difficulty of securing standard rubber-lined hose the use of 2½-inch mill hose, with small nozzles and an unusually close spacing of hydrants, was decided upon.

In general the National Army cantonments had higher standards of water supply and of fire protection than the average city of like size. As nearly as can be ascertained, the average per capita cost of the waterworks of the 16 National Army cantonments, including service connections to within 5 feet of the buildings, was less than one-fourth of the present cost of the average municipal waterworks system. This is partly accounted for by the great density of population in the camps and by the fact that about 70 per cent of the distribution mains were made of wood-stave pipe, which cost much less than cast-iron pipe.

The use of wood-stave pipe was determined upon for the reasons that it was impossible to secure cast-iron or steel pipe in time; that such materials were urgently needed for other war work; that the cost of wood-stave pipe laid complete would be only about 50 per cent of that of cast-iron pipe of like dimensions and strength; and that its smooth interior surface would permit of delivering about 20 per cent more water than cast-iron pipe for the same loss of head. It is stated that the western wood-stave pipe proved satisfactory,

particularly Redwood pipe, the life of which is estimated at 20 to 25 years.

For the National Guard camps 35 gallons daily per capita was fixed instead of the 55 gallons allowed for the National Army cantonments. As a sufficient quantity of wood-stave pipe could not be secured for the former it was used only in the three camps in California and New Mexico. Cast-iron pipe was used in the 2 camps in Alabama and steel pipe in the other 11 camps.

Careful investigation was made of the sources of water supply. Purification plants were installed where the quality of water was considered unsuitable without them. Where possible the supply was taken from established municipal plants, which usually had to be enlarged. In other cases it was necessary to provide wells and pumping plants. The water supplies provided proved of adequate capacity and the marked absence of water-borne diseases showed conclusively that they were pure in quality.

SEWERS.

The problem of cantonment sewerage design was difficult, for it was evident that sewage characteristics and rates of flow would differ radically from those of municipalities. The per capita daily water consumption (55 gallons) had been fixed, but high-peak flows from shower baths, etc., were certain to occur because of the synchronizing of troop actions entailed by military regulations. Study of the Fort Myer and other data showed that the ratio of the peak flow to the average 24-hour flow in a divisional cantonment would probably be from one and one-half to twice that occurring in municipal systems.

Computations proved that to meet all these conditions the sewers would have to be extremely large. It was therefore concluded to limit, if necessary, the use of shower baths to one infantry brigade, or its equivalent in population, at one time; also to figure the size of the main sewers on the assumption that they would flow full during high rates of flow, although in municipal practice it is customary to figure on less than a full flow. The wisdom of these decisions was proven in practice as, because of the time interval between individual unit flows caused by the differing distances of the units from the large sewers, it has been found unnecessary to limit the use of showers.

Sewers ranged in diameter from 6-inch to 24-inch, with a few trunk and outfall sewers of 30-inch diameter. Trenches were as shallow as possible, with gradients figured sufficient to produce a self-cleaning velocity of approximately $2\frac{1}{4}$ feet per second when running full or half full. The spacing of manholes averaged about 350 feet. These were all built of brick or concrete, cast-iron frames being eliminated, and had locked wooden covers to prevent their use as receptacles for refuse, garbage, old clothes, etc.

SEWAGE-DISPOSAL PLANTS.

Initial expenditures on this class of construction was minimized. Where possible sewage was run into adjacent bodies of water of sufficient size to properly dilute it. In other cases connections were made to existing municipal systems. Where neither of these two methods was available, septic tanks and disposal beds, and in some cases rock-trickling filters were constructed.

SEPTIC TANKS.

The standard plans for septic tanks were designed to provide the most economical construction for the purpose. The size and number of the tanks was kept down on the assumption that they would be required for only a limited period of time and that construction should be minimized, even at a possible increase in the cost of operation. The tanks were designed on simple lines to reduce construction work and cost. They were of the one-story, multiple compartment, horizontal flow type, with hopper bottoms, provided with baffles and cross walls or weirs in such manner as to facilitate sedimentation and withdrawal of sludge.

The designs for tanks assumed an average daily sewage flow for cantonments and camps of 60 gallons per capita and for hospitals of 150 gallons per bed plus 60 gallons per attendant; also an average sewage detention period in tank of six hours, allowance being made for capacity occupied by sludge.

Much data of future value has been obtained from the operation of these sewage utilities. The features of special interest which are deemed worthy of note here are as follows:

Camp sewage developed marked differences from ordinary municipal sewage. Numerous tests showed the grease content to average 150 parts per million, or from five to seven times that of ordinary domestic sewage. Other constituents of camp sewage in parts, per million, were:

Total organic solids	700
Total suspended organic solids.....	464
Free ammonia.....	48
Total organic nitrogen.....	32

These figures show high concentration and an exceptional quantity of suspended organic matter, largely due to the relatively small water consumption per capita, the inclusion of waste products from kitchens, and the wholly adult character of the population.

GREASE TRAPS.

Ordinary commercial grease traps were installed initially in kitchen-waste lines, but proved unsatisfactory, as they did not remove sufficient of the grease content. Traps holding approxi-

mately two-thirds gallon per capita were designed later and installed in nearly all of the cantonments to protect the sewer lines from grease deposits, relieve the sewage-treatment plants, and recover large quantities of valuable and needed grease. The special features of these traps are the relatively large areas for the collection of grease, the conical bottom, and the small eduction pipes for removal of settling solids. Tests of these traps showed their average efficiency to be at least 95 per cent. The grease recoveries effected averaged 13 pounds per capita yearly. Rendering plants were installed in some cases for purifying and rendering more valuable the grease so obtained.

SEWAGE FILTERS.

In most cases sewage treatment required only septic tanks, already described, and automatic chlorinating equipment. Comparatively few cases necessitated the installation of secondary treatment works, consisting of trickling filters and sedimentation tanks. Trickling filters, owing to their large capacity, simple operation, and low cost were adopted as the best means for the secondary treatment of sewage. The designs of these filters diverged in several respects from usual municipal engineering practice.

The trickling filter has an undulating floor, with the distributor pipes located on the summits and the gutters in the depressions. The filtering material used was crushed rock or slag, of size passing through 2½-inch and retained by 1½-inch circular openings. This provides large voids and free circulation of air. The first trickling filters constructed were 6 feet in depth, the present standard being 5 feet in depth.

Initially, the high grease content in the sewage prevented proper bacterial action in the filters, but this was rectified, as stated, by more efficient grease traps.

A series of tests made on the Fort Myer (Va.) filter showed an average reduction of 95 per cent in total count of bacteria and a 92 per cent reduction in *B. Coli*. Numerous tests of this type of filter, made during the summer of 1918, showed the effluent 100 per cent stable at all times.

Intermittent sand filters were used in a few cases, but, even where the soil was of exceptionally good character for the purpose, were not entirely satisfactory owing to the unusually high grease content in the sewage. It was therefore necessary, in some instances, to construct tanks for the preliminary treatment of sewage before discharging it upon the sand beds. These filters were usually higher in cost of construction and operation than the standard type of trickling filter plant above described.

Some criticism has been made of the septic tanks, including the statements that the sludge does not digest, particularly in the first compartment, and that the operation is one of sedimentation and not digestion. As was anticipated, the operating cost of these tanks has been high on account of the necessity of frequently removing the undigested sludge, which is objectionable and must be run into trenches and buried. Reply to the above quoted criticism is made to the effect that it was the intention, when these tanks were built, in the summer of 1917, to increase their size later when more time was available, probably in the summer of 1918. In only a few cases, however, had this been done at the time of the armistice, some of the extensions being then uncompleted or not in operation.

The problems of sewerage and sewage disposal were, as a whole, well handled. The additions found necessary were principally in items which, at the time of initial construction, were curtailed because of the great importance which attached to speed and the necessity of minimizing the amount of construction work as well as the cost.

ELECTRICITY SUPPLY.

Electric energy was purchased for lighting purposes from the nearest available source. In all except one of the cantonments the electric energy for power purposes was also purchased.

The standard distribution system adopted for the National Army cantonments and the National Guard camps was 3-wire, 3-phase, 60 cycles, 2,300 volts for primary distribution, and 3-wire, 220-110 volts for secondary distribution. The exceptions to the above were Camp Jackson, Columbia, S. C., where the frequency is 40 cycles; Camp Meade, Admiral, Md., where it is 25 cycles; and Camp Sherman, Chillicothe, Ohio, where part of the power is 25 cycles and the balance of the power and lighting is 60 cycles due to the service being furnished by two companies, neither of which could alone care for the entire load.

The maximum demand in winter averaged about 25 watts per capita for the National Army cantonments. The daily load factor varied from 30 to 50 per cent. In the latter instance laundries and sewage and water pumping were operated electrically. In the camps where city water was furnished and no sewerage pumps installed, the day load was small. The load curves of the larger camps where considerable power is installed, resemble those of central stations in the larger cities, except that the morning peak is more accentuated.

EXTERIOR LIGHTING.

Series incandescent systems were used throughout with 6.6 ampere, 100 candlepower lamps and radial-ray reflectors on gooseneck brackets, spaced from 250 to 300 feet apart and attached to poles. To

guard against interruptions affecting large areas, the lighting is arranged in groups, each of which is supplied by a pole-type constant-current transformer controlled by a pole-type switch operated by ropes from the ground.

INTERIOR LIGHTING.

A standard arrangement of 40-watt lamps was adopted in order to simplify the work and the purchase of materials. Lamps of other sizes were used in places requiring especially good lighting. Metal cone reflectors were used generally, with wire lamp guards in lavatories, storehouses, and other buildings where the lamps were subject to breakage. The system of wiring was generally open cleat or concealed knob and tube, the conduit system being used in garages and laundries. Buildings were provided with service switches. Where there were a number of circuits the fuses were all grouped in one place.

Standards for illumination were roughly, 0.2 watts per square foot for barracks, 0.25 watts for quartermaster depots, and 0.5 watts for quartermaster pier sheds from which goods were loaded on board ship. Electric power equipment for the latter for gantry cranes and dock winches was direct current supplied from rotary converters. The lighting supplied to these warehouses was alternating current and, in all cases where practicable, was taken from central station systems.

The old standard lighting contract forms used by the Quartermaster Corps were found unsuitable. In their place were generally used the standard forms of the local Central Station Company, with a war rider containing all the special features necessitated by Government needs. The regular rules of the company for the supply of energy to private enterprises having similar service characteristics were generally adopted.

The construction of some transmission lines and substations was necessary. The Government bore the cost of these with the stipulation that the company, at the termination of the contract, would take over, on a proper basis, whatever equipment it could use.

In a number of cases the utilities serving the territory were unable, with their equipment, to furnish the needed service. When investigation showed that a plant owned and operated solely for Government purposes would be uneconomical, the Government assisted in making the necessary plant extensions. In some cases it actually owned the equipment. In certain instances it was found to be advantageous for the Government to construct an addition to an existing power station. This action resulted in the station being divided by theoretical lines, the plant on one side owned by the Government, and on the other side by the utilities company. It was, in such a

case, provided that upon termination of the contract the utility company buy the land at a figure sometimes predetermined, and sometimes to be based on the usefulness of the property to the utility company. The intention was always to make the contract as equitable as possible to all concerned, for which reason many of the contracts which involved large amounts of power contained coal cost clauses.

The telephone and automatic fire-alarm systems in all cantonments and camps were installed by the Signal Corps.

ROADS AND WALKS.

Specifications were made for four standard types of roads—water-bound macadam, bituminous macadam, brick, and concrete. Roads constituting the main arteries of traffic were paved in one of these ways. No one type of road construction was used in all parts of the cantonments and camps. The selection of type being dependent on a number of factors, such as materials available and required, character of subgrade, equipment available, and speed of construction, was usually left largely to the discretion of the constructing quartermaster. The standard width of pavement was 18 feet, although in some instances pavements 24 feet wide were constructed.

The roads built in the cantonments and camps totaled 701.15 miles in length. The mileage of each type was as follows:

Cement concrete.....	98.98
Brick.....	.95
Bithulithic macadam.....	115.93
Water-bound macadam.....	72.43
Slag macadam.....	2.38
Cinder.....	1.74
Gravel.....	254.17
Sand clay.....	37.42
Unsurfaced.....	117.15
Total.....	701.15

The construction of walks was not, in general, authorized. Gravel or crushed stone walks were constructed in a few instances, particularly in the vicinity of hospitals, and, in some cases, around the more important buildings, such as division and brigade headquarters, camp post offices, telegraph offices, etc. The sidewalks in most of the camps were built mainly of wooden strips, or boards, laid on crosspieces. Cinders, where available, were also used.

HEATING.

At the National Army cantonments, with the exception of Devens, Grant, Custer and Dodge, which are the four farthest north, the heating of nearly all the buildings is by stoves and room heaters.

The use of such heaters in the dormitories of barrack buildings of this type was a departure which proved successful. For this heating work there were purchased about 30,000 stoves and 45,000 room heaters, or hot-air furnaces cased as room heaters.

At all cantonments the hospital buildings, medical infirmaries, officers' quarters, laundry, bakery, telephone and telegraph buildings were heated by steam.

Steam heating plants were installed in the four northern camps named. These consisted of a central plant for each regimental unit or group of similar size. The steam mains from each heating plant to the buildings were supported overhead by poles, and insulated. It was decided that the cost of placing these steam mains in trenches, deep enough underground to keep them below the frost line, would be an unwarranted expense. This decision was undoubtedly correct, considering the period for which the camps were expected to be used and that the heating systems were in use less than half the year. In the regimental heating plants, particularly, every detail not essential to the heating of the buildings was eliminated to conserve time, labor, and material.

In the National Guard camps the heating of all buildings, including hospital buildings, with the exception of the operating pavilion, which was heated by a steam heating plant, was by room heaters and stoves.

For the heating work at the National Army cantonments about 300 horizontal tubular boilers of 150 horsepower each, making a total of 45,000 horsepower, and about 150 large and 1,700 small cast-iron boilers, of the sizes ordinarily used in residence heating were purchased and installed. Approximately 4,700,000 square feet of cast-iron radiation surface was used on this heating work.

FIRE PROTECTION.

At the request of the Cantonment Division, the National Board of Fire Underwriters, on May 27, 1917, detailed two of its engineers to the division. One was detailed directly to the water and sewerage departments of the engineering division and attended mainly to fire prevention features affecting the water supply; the other gave his attention particularly to fire-fighting apparatus and the prevention of fire during construction.

The use of wooden buildings for the National Army cantonments was unavoidable in order to meet the need for rapid construction as well as cost limitations. The number of these buildings, about 1,700 in each cantonment, made fire protection important. After study by the engineering staff a general program was adopted, which included the following features—

(a) The general plan of the cantonments to provide proper distances between the several buildings of each unit to prevent the spread of fire from building to building. The general plan also to provide fire breaks having a minimum width of 300 feet and spaced about every 2,100 feet across the major dimension of the cantonment.

(b) Construction requirements which tend to reduce the hazard of fire started within a building, consisting of closing in the building below the first floor, regulating the setting of stoves, ranges and heaters, and electric work in accordance with the National Electric Code.

(c) A water supply system designed to deliver water throughout the camps under a sufficient pressure and with hydrants so placed that 16 streams could be concentrated on any of the large barrack buildings with lines of hose of which none would exceed 500 feet in length.

(d) The distribution of first-aid fire extinguishing apparatus throughout the buildings, these to include fire pails, chemical extinguishers, water barrels, and hand pump tanks.

(e) The distribution of hand hose carts, each carrying 500 feet of fire hose and equipment for the use of regimental fire brigades.

(f) A military fire company recruited from men having training in paid fire departments. This company to be stationed at three or more fire houses and equipped with motor fire trucks carrying all the usual equipment of a city fire department.

(g) Provision for fire-alarm service, consisting of several telephones distributed throughout the camp and accessible at all times, over which fire alarms could be sent to the telephone exchange, from which fire alarms would be transmitted to the fire stations by telephone, and a special fire-alarm gong circuit of fire-alarm direct type. A large siren for general notification of the entire camp was also included.

(h) In divisional storehouses, additional protection in the way of automatic fire-alarm systems.

An engineer of the National Board of Fire Underwriters was detailed at each camp during the construction of the 16 National Army cantonments to act under the constructing quartermaster as advisory engineer and fire marshal. In nearly all cases he also actually supervised the construction of features relating to fire protection and prevention, so assuring proper construction and protection from the common hazards, the installation of the interior fire-fighting appliances, and the organization of the fire truck and hose companies.

These means and methods of fire protection and prevention were proven to have been well thought out and designed, as, during the construction period, the total property loss was only about \$2,000 in

the National Army cantonments and about \$15,000 in the National Guard camps, the latter loss being caused by the only fire of consequence which occurred during the construction period. During 1918 the reported loss in the cantonments and camps was 46 cents per capita, against a reported loss of \$2.242 per capita throughout the United States during 1917. Thousands of fires have started at the cantonments and camps, but there have been few cases in which a fire extended beyond the building in which it originated and, in most instances, a part of the building in which the fire started was saved.

GARBAGE DISPOSAL.

In the summer of 1917 study was given to the problem of the collection and disposal of garbage and other wastes at the 16 National Army cantonments. This resulted in a decision to classify the waste materials and separate them in such a manner as to secure the maximum returns from their sale. It was found impracticable to install reduction plants for the disposal of garbage, because of high cost and the long time required for delivery of equipment. The plan finally adopted was to collect garbage and waste materials and transport them to a central transfer station, where they were delivered to a contractor. He was required to haul all organic waste material to a point sufficiently beyond the limitations of the Government reservation to avoid the possibility of creating a nuisance or injuring the health of the troops. In some instances the contractor disposed of the garbage by means of reduction plants in near-by municipalities. In other cases it was fed to hogs.

Incinerators were installed at each transfer station for the destruction of such material as had no commercial value, and for use in an emergency, if, for any reason, the contractor failed to remove garbage promptly. In designing a camp incinerator the quantity of material to be handled is figured at 1 ton per 1,000 men per day and 8 hours operation is assumed. The design calls for ample firing and combustion chambers; grate service for natural draft to burn 35 pounds per hour and 60 pounds per hour with forced draft; drying hearths to facilitate cremation and prevent liquids from reaching grates; dampers to control drafts; and stack area and height sufficient to prevent back-firing and to create an average gas velocity of approximately 20 feet per second.

Waste material was classified as follows: Garbage, paper, bottles, tin cans, bones, fat, grease, and manure. The sale of these materials, rather than their destruction in incinerators at a large cost for equipment and fuel, has resulted in considerable revenue to the Government. The sales of garbage and other waste amounted to \$360,570 for the months of July, August, September, and October, 1918.

PLUMBING MATERIAL.

Prior to and during the organization of the Cantonment Division many of the representatives of industries which would be called upon to furnish large quantities of material had been consulted and several committees had been formed looking to the mobilization of such industries therefor. This was particularly true of plumbing material, for the allocation of which among manufacturers those prominent in the industry had worked out a definite plan and formed a committee to arrange the preliminaries.

It was determined that the new armies should have the most sanitary arrangements and conveniences that could be obtained. Complete lavatories were provided, using the best quality of plumbing material that could be bought in quantity. Trouble was experienced with some of the faucets and bibbs, a portion of which had to be replaced, owing to the limited quantity of heavy patterns securable.

SECTION 12.

MATERIAL FOR CANTONMENTS AND CAMPS.

Much apprehension was felt that sufficient material could not be secured to build the 16 National Army cantonments within the time limit. Difficulties were overcome and most of the material was purchased from competitive bidders to whom invitations were issued by telegrams sent from Washington, as the emergency made it necessary to eliminate the usual advertising and public letting of contracts.

There were some exceptions to this method of purchasing of which lumber was an instance. This was the largest single item in the construction of cantonments and camps and was purchased through an organization formed by the lumber manufacturers' associations, which organized offices in Washington. This cooperated with the Government representatives in fixing prices and allotted orders to dealers who were thought to be able to deliver the material as needed. The prices obtained through this organization were lower than the prevailing market prices. The knowledge and experience supplied by this organization and the energy shown by its members in the discharge of their duties were important factors in building the cantonments and camps on time.

Large purchases were made from manufacturers of plumbing materials, who also established a Washington office and, with the approval of the Government, nominated one of their number to handle and allot orders for these supplies to manufacturers. This method worked well, saved time and secured the benefit of expert

assistance in placing orders. A similar plan was followed in purchasing other articles and commodities, of which a shortage was anticipated. The War Industries Board later took over the control, allotment, and fixing of prices of many essential materials.

It was necessary to determine freight rates before orders could be placed, based on the cost of material delivered to the project sites. The freight charges were estimated at special Government rates fixed by the provisions of the land-grant acts, which were on file in the office of the auditor of the Army. For this work an experienced railroad rate man was placed in such office.

In connection with its work of designing the cantonments the engineering branch kept in close touch with market conditions and endeavored to specify only such materials as were available. An instance of this was the extensive use of wood stave pipe, which was adopted when it became known that the manufacturers could not supply cast-iron pipe needed for all Government requirements. The wood stave pipe proved satisfactory and more economical. When the supply was exhausted it had become possible to obtain steel pipe for the remainder of the work, principally for the National Guard camps.

Conditions existing in the early spring of 1917 were favorable for obtaining much of the material required for the original cantonments and camps, as ample supplies of most kinds of material were then available. Moreover, there was little shortage of labor to cause delay in its production, transportation, or unloading. As the Cantonment Division was the first of the construction bureaus to start, for some time it had all the labor and material markets to itself. At this time the Priorities Board, War Industries Board, Inland Traffic Service, Division of Purchase, Storage and Traffic of the War Department, and other war agencies and service bureaus were not organized. The large supply of materials at first available made restrictions or control unnecessary and many complications and delays were avoided. One bill of materials served to place orders for all the cantonments.

SECTION 13.

LABOR FOR CANTONMENTS AND CAMPS.

Labor and its problems in war construction are referred to in Part I, and are also dealt with at considerable length in Part III. As they had an important bearing upon the construction of the cantonments and camps, they are briefly treated here.

On War Department emergency construction work labor was employed in accordance with the terms of an agreement made between the Secretary of War and Mr. Samuel Gompers, representing the

American Federation of Labor. This was signed on June 19, 1917, and was made retroactive and effective as of June 1. It provided that, for the adjustment and control of wages, hours, and conditions of labor in the construction of cantonments, there should be created an adjustment commission of three persons appointed by the Secretary of War, one to represent the Army, one the public, and one labor, the last to be nominated by Mr. Gompers. It also provided that the union scale of wages and wage conditions prevailing in the vicinity of the work should be maintained.

The construction of the cantonments and camps was carried out without any important interruptions from strikes. Some questions arose with the carpenters' unions, which objected to the jurisdiction of the adjustment commission on the ground that they had never entered into any agreement submitting to such jurisdiction. In these cases the commission advised the carpenters that their contention was proper, that they had the option as to whether or not to submit; but that submission would necessitate acceptance of its award. In every case the carpenters submitted to the jurisdiction of the commission and accepted its award.

The War Department had approximately three months, when the Baker-Gompers agreement was made, in which to provide the housing and training facilities for the army which was to be called. It was necessary to provide effectively against serious interruptions from labor controversies, as these would have delayed construction and made it impossible to house the army. It is stated that in the effort to avoid delays the officials of the international unions employed cooperated well.

An adequate supply of labor was the most essential factor in the cantonment construction program. No similar demand for both skilled and common labor had ever before existed in the United States. Construction forces on each of the sixteen projects were organized or expanded, in less than a month, from a few men up to 8,000 or more. During August and September of 1917 the employees at work on a project frequently numbered 10,000, and in one or two cases reached 14,000. It was found impossible to properly supervise all the men in such an organization, as they had been hurriedly assembled and many of the foremen were unknown to each other, to their crews, and to the contractor for whom they worked.

There was little time to select or choose men and the supply of competent men was usually inadequate. Carpenters especially were needed, but the work called for handiness and judgment rather than skill. This was proven by results secured through the use as carpenters of a large number of men who had not been trained in that trade. Those familiar with the work doubt that it would have progressed any faster if all the men had been skilled carpenters.

It is the general testimony of all who directed and executed this construction that the carpenters worked well on most of these undertakings, while many of the plumbers, steam fitters, and electricians, realizing that their number was limited, took advantage of the circumstances to delay the work in an effort to advance their own interests.

During the first two months construction was pushed by working with all possible overtime, including Saturday afternoons and Sundays, with the result that the men became tired and inefficient.

Intermittent increases in output were effected by frequent appeals to patriotism. The results measured in output per man-hour were below those usual on like work in peace times. As it was absolutely necessary to get the work done on time, these conditions could be offset only by the use of more labor.

A number of the cantonments were located so far from available living facilities that the contractors were compelled to provide housing for the workmen and to conduct commissaries and stores for their board and maintenance. Special efforts were made to improve the morale of the men. These consisted principally in improving living conditions, bettering the quality of the food and service, providing entertainment in the way of theaters, moving pictures, etc., and furnishing transportation to the nearest town that offered recreation and entertainment. Whenever this service for any reason was inadequate, improperly operated, or thought unsatisfactory, the mechanics and laborers would not stay on the project, even with liberal overtime allowances.

In some localities mosquitoes were present in great numbers. They annoyed the men at night, causing them to lose sleep, thus depreciating their working efficiency, and so harassed the men during the day as to interfere with the progress of the work.

SECTION 14.

TRANSPORTATION FOR CANTONMENTS AND CAMPS.

The railroads were operated under private management until January 1, 1918, when their control was taken over by the Government and their operation placed under the United States Railroad Administration.

The railroads placed their facilities for transporting cantonment and camp material at the disposal of the Cantonment Division and cooperated effectively with it. In the summer of 1917, when the construction was well under way, a general car shortage, due to war conditions, occurred throughout the country. To obtain enough cars to transport materials from the mills to projects was a difficult

problem, and it was necessary to make special arrangements for the transportation of this material. As car distribution was in charge of the car-service committee of the railroad presidents' war board, it was necessary, when orders were placed with the lumber bureaus, to notify the car service committee as to the general territory from which the shipments would be made and the number of cars required, in order that they might make arrangements for the necessary cars. Later the shipping point was given in order to secure the best distribution of cars. To prevent the use of these cars for the shipment of private instead of Government material, all dealers having Government orders for lumber were required to apply all cars to such orders until filled.

In some cases the urgent demand made the fastest possible movement essential. For instance the pipe needed for water supply at National Guard camp, averaging about 13 miles per camp, was ordered, manufactured, delivered, and placed in about five weeks.

Approximately 120,000 cars of material were transported for the construction initially authorized on the National Army cantonments and National Guard camps. Owing to the general unfamiliarity of freight agents with Government bills of lading it was necessary to authorize the use of commercial bills of lading with the proviso that they be completed by the constructing quartermaster upon receipt of the material. These were then passed through the central clearing house established by the railroad presidents' war board in Washington. This method provided satisfactory and prompt payments of freight charges and the full benefit of Government land-grant rates was secured.

The railroad facilities at first were inadequate. At some projects the sites had been selected by boards of Army officers who apparently were influenced more by military requirements than conditions favoring quick and economical construction and availability of materials and labor. In some cases the cheapness of the land may have influenced their decision, although the additional cost in money and time of the extra clearing, road building, grading and supplying utility-services was greater than the supposed saving, even omitting consideration of the great increase caused in the construction cost by handicaps of this kind.

The constructing quartermasters did not all at first understand the necessity for ample railroad connections and sidings at the sites for receiving and handling large amounts of material which would be delivered in a short time. The Government had decided that the construction of such sidings and extensions from existing railroads to camp sites should be undertaken and paid for by the railroad companies, and claimed that the profit from the business of transporting freight and passengers would warrant such expenditure. As many

of the railroads did not concur in this view there were delays in starting some of the sidings with the result that efficient unloading could not be done when the materials began to arrive in quantity.

It is the opinion of the Board of Review that the Government should, as a rule, have borne this special expense and undertaken to amortize it gradually by charging the railroad companies some percentage of the freight payments for the use of the track. If this matter had been so handled the first cost of these railroad extensions would probably have been paid for by the saving in extra cost of construction caused by delays and by expensive cartage necessitated by lack of railroad facilities, and the work would have been expedited.

The work done by the railroads and their hearty cooperation was most helpful. They assumed the responsibility of seeing that this important war construction work should not lack needed transportation service. A substantial part of the credit for the results accomplished belongs to these railroads for their efficient work.

SECTION 15.

HEALTH AND VITAL STATISTICS OF CANTONMENTS AND CAMPS.

The sanitation and hospital facilities essential to the safeguarding of the health of troops housed in the cantonments and camps were constructed by the Cantonment Division for the War Department.

Questions of water supply, sewerage and sewage disposal demanded consideration in planning all these projects. A supply of pure water and proper means for the handling and disposal of sewage had to be provided wherever barracks or quarters were built.

The water-borne disease, typhoid fever, was the greatest scourge to American armies in former wars. During the Spanish War, in 1898, there were 37,166 certain or probable cases of typhoid fever and 1,580 deaths out of a mean Army strength of 107,973 men. The case rate was 192.65 per 1,000 and the mortality 14.63 per 1,000 of mean strength. If similar conditions had prevailed in this war, with the effective strength of the Army taken at 2,500,000, the typhoid fever cases would have numbered 481,625 and the deaths therefrom 36,575.

The total number of men who passed through the cantonments and camps is as yet undetermined. From September 1, 1917, to December 27, 1918, the average in the cantonments was 519,954. During this period there were 154 cases of typhoid, with 28 deaths, making an annual death rate of 0.04 per 1,000. The corresponding average in the National Guard camps was 305,032, and during the same period there were 148 cases of typhoid with 8 deaths, making an annual death rate of 0.02 per 1,000. The Surgeon General's office states

that, in its opinion, these cantonment and camp cases were contracted outside of Government reservations.

The sanitation work at the various cantonments and camps is not, however, to be credited with all of these reductions toward which the standard army practice of antityphoid inoculation contributed greatly, although some of the men were able to evade inoculation. Few typhoid cases developed among the thousands of mechanics and laborers on the reservation during the construction period. It was customary, as soon as construction was started at any cantonment or camp, to install water chlorinating apparatus and to use every safeguard to protect the health of the construction forces and the troops.

The Public Health Service carried on an extensive work in the prevention of typhoid, malaria and like diseases and in clearing, ditching and filling extra cantonment areas around the various camps for distances varying from one-half mile to 1 mile. The areas protected by measures for malaria control varied in proportion to the size of the cantonment; the smaller areas consisted of from 8 to 15 square miles and larger areas ranged up to 90 square miles. There was practically no malaria contracted by the troops at southern cantonments.

In some areas near the cantonments and camps many cases of malaria were reported to have occurred yearly, prior to their construction. Since their construction and occupation by the Army, extra cantonment areas have been almost freed from mosquitoes and malaria has been almost entirely eradicated from the civil population inhabiting them.

The decision to provide in the cantonments the best water, plumbing, sewerage and disposal facilities was sound and deserving of commendation.

Changes made in the original designs for barracks, which changes consisted of allowing more space per man and reducing the number of men housed in one room, provided to some extent against the spread of the so-called respiratory group of diseases. These differ from typhoid in origin and characteristics. They include influenza, pneumonia, measles, scarlet fever, meningitis, tuberculosis and certain other diseases of less importance and are conveyed by contact or droplet infection.

The Surgeon General's office is authority for the following statement, made at a hearing held by the Board of Review on March 19, 1919:

Prior to the influenza epidemic of 1918, the annual death rate in the Army of the United States, for the year ending August 30, 1918, was 6.37 per 1,000. Sixty-three per cent of the total number of these deaths were caused by pneumonia. The death rate of 6.37 per thousand is remarkably low and compares favorably with that of males

of corresponding age in civil life. Whenever men are brought together in numbers there is always an epidemic of contagious diseases such as measles, scarlet fever, meningitis, pneumonia, etc. The number of these cases in the Army during the period of mobilization was not greater than would be expected. The general health of troops in the camps as a whole was exceedingly good, in fact, it was a record for health until the outbreak of the influenza epidemic.

This epidemic, said to have been the greatest known plague in the history of the world, seemed to have been particularly virulent in the training camps in the United States.

For the period ended December 31, 1918, covering the period in which the influenza cases were the highest in number, 94 per cent of the total deaths were from pneumonia induced by influenza.

Experience has shown that the death rate induced by influenza in overcrowded cantonments where men were housed in large numbers in a single squadroom was materially higher than in an individual camp group where men were housed in tents (five to a tent). The occurrence of pneumonia as a complication of influenza or measles has materially increased where overcrowding has been present, both in barracks and hospitals.

Comparisons have been made as to the prevalence of influenza and pneumonia in certain cantonments and in civil communities immediately adjoining them. These comparisons indicate that a larger percentage of the population of the cantonments has become infected and a larger proportion of pneumonia has developed than in civil communities. The reason for the greater prevalence in the cantonments lies in the greater density of population in camps as compared to adjacent communities, and in the different condition of housing. In the civil community individuals are usually housed one or two or possibly three in a single room, and the opportunity for contagion or infection is minimized. In the cantonments, on the other hand, large numbers of men are herded together in a single room, and the opportunity for infection is materially increased. A single case of pneumonia developing in a squad room containing 35 men will almost surely infect a large proportion of the susceptible individuals in that room.

Men drawn from rural communities are more susceptible to contagion or infection than men who have been exposed to contagion or infection in crowded city communities, the latter having either contracted such diseases in the past or being immune from them. Early in June, 1917, a board consisting of the Surgeon General and three doctors was appointed by the Secretary of War to examine the housing plans for large cantonments then under construction. One of the recommendations made by the committee was, that the cubic air space per man be increased to 500 cubic feet, and that the unit housed in each barrack be reduced to 30. On the reorganization of the Army in 1917, caused by the change in the personnel to conform to the so-called Pershing Division, these recommendations were followed: A new barrack containing 66 men, about evenly divided on two floors, with a separate stairway to the second floor, was designed and used thereafter. The barracks already constructed, however, were largely of a type having 50 men to the squadroom.

Another cause of infection is the handling and passing of dishes at mess and the washing of the mess kits in infected dish water and wiping them on infected towels.

Loss of life from preventable diseases has an economic aspect of great importance. During this war the loss to the Government in war-risk insurance benefits alone from deaths caused by diseases of the respiratory group are estimated as something over \$400,000,000 to date. The additional expense incidental to correcting sanitary defects in the present scheme of housing would be a mere trifle in comparison with the stupendous sum the Government will have expended in death benefits alone.

With respect to the foregoing, the Board of Review is of the opinion that, while it is impracticable to house the Army in single rooms, the subdivision of the barrack buildings, by three-quarter partitions, into squadrooms containing not more than 15 or 18 men each could be economically accomplished, allowing each man about 60 square feet of floor space; that the lavatories should be so conveniently located that men could be required to wash their hands before meals; that whenever and wherever practicable, considering fire hazard, sanitation should be promoted by providing toilet facilities so connected to sleeping quarters that they might be used without exposure to weather.

The board is also of the opinion that some of the health and vital statistics given are not strictly comparable as a measure of sanitary and health conditions because the Army was composed of men selected for their good physical condition.

SECTION 16.

OPERATION AND MAINTENANCE OF CANTONMENTS AND CAMPS.

Upon completion of the cantonments and camps, their operation and maintenance were placed under the construction and repair division of the Quartermaster Corps, which was obliged to secure additional personnel. For this work it selected men from civil life experienced in the operation of utility services.

In a number of cases, after construction was completed, the supervising engineer or members of his staff were continued on operation and maintenance and placed in charge of the water, sewer, and electric systems, roads, etc.

On October 10, 1917, the construction and repair division of the Quartermaster General's office was abolished as a division, and the organization, with all personnel, records, etc., transferred to the Cantonment Division of the Army. This promoted cooperation between the constructing and operating forces and assured operation along lines intended by the designers. Operation and maintenance are dealt with in greater detail in Part III, in the section entitled "Maintenance and repair division."

SECTION 17.

PROGRESS OF CANTONMENT AND CAMP CONSTRUCTION.

The Board of Review has prepared the following tables in order to present the essential facts respecting the rate of construction and of troop occupation of the cantonments and camps.

It has selected dates which are either identical or as close as possible to compare the completion of troop accommodations with the troop arrivals. The figures for the arrival of troops in each case are given for the same or for a later date than those showing the completion of accommodations. The figures in the horizontal column marked 3 show the accommodations ready and those in the horizontal column marked 5 show the troop arrivals on each of the several dates.

TABLE 10.—*Dates cantonment sites were approved, contracts were executed, and work started, the accommodations completed for troops on Sept. 4 and 17, Oct. 1, and Dec. 1, 1917, and the arrival of troops to Sept. 5 and 24, Oct. 8, and Dec. 10, 1917.*

National Army can- tonments.	Location.	Date camp site ap- proved.	Date contract executed.	Date work started.	Number of officers and men for whom completed quarters were ready on—			
					Sept. 4, 1917.	Sept. 17, 1917.	Oct. 1, 1917.	Dec. 1, 1917.
Custer.....	Battle Creek, Mich.....	June 11	June 19	June 19	10,000	26,220	28,000	34,045
Devens.....	Ayer, Mass.....	May 31	June 11	June 13	16,458	31,458	35,288	35,288
Dix.....	Wrightstown, N. J.....	June 2	June 14	June 14	9,000	9,000	26,800	41,309
Dodge.....	Des Moines, Iowa.....	June 27	June 22	June 19	10,800	22,000	35,800	40,526
Funston.....	Fort Riley, Kans.....	June 13	June 20	June 28	23,000	36,261	41,564	41,564
Gordon.....	Atlanta, Ga.....	June 2	June 21	June 18	14,000	20,000	25,000	39,796
Grant.....	Rockford, Ill.....	June 21	..do....	June 24	7,000	27,800	38,680	41,309
Jackson.....	Columbia, S. C.....	June 2	June 11	June 15	12,500	19,200	30,000	42,498
Lee.....	Petersburg, Va.....	June 8	June 18	June 20	18,000	18,000	40,000	45,512
Lewis.....	American Lake, Wash.....	May 31	June 15	June 14	7,500	25,000	29,100	44,685
Meade.....	Admiral, Md.....	June 22	June 23	July 2	7,500	15,000	34,371	41,309
Pike.....	Little Rock, Ark.....	June 11	..do....	June 17	12,000	30,000	38,975	42,347
Sherman.....	Chillicothe, Ohio.....	June 21	June 21	July 6	13,800	17,500	32,000	38,393
Taylor.....	Louisville, Ky.....	June 11	June 20	June 22	13,000	23,031	42,510	43,939
Travis.....	Fort Sam Houston, Tex.....	..do....	..do....	June 14	14,260	22,700	41,353	41,353
Upton.....	Yaphank, L. I.....	June 18	June 23	June 21	7,000	16,900	24,600	40,913
Total.....	.....	.....	.....	.....	195,818	360,070	545,041	654,786

Arrival of troops at National Army cantonments on¹—

Sept. 5, 1917.....	31,643
Sept. 24, 1917.....	271,201
Oct. 8, 1917.....	401,364
Dec. 10, 1917.....	478,214

¹ Compiled from annual report of the Surgeon General, 1918.

TABLE 11.—*Dates camp sites were approved, contracts were executed, and work started, the accommodations completed for troops on Aug. 15, Sept. 1 and 17, and Dec. 1, 1917, and the arrival of troops to Sept. 1 and 21, and Nov. 30, 1917.*

National Guard camps.	Location.	Date camp site approved.	Date contract executed.	Date work started.	Number of officers and men for whom completed quarters were ready on—			
					Aug. 15, 1917.	Sept. 1, 1917.	Sept. 17, 1917.	Dec. 1, 1917.
Beauregard..	Alexandria, La.....	July 12	July 17	July 23	.....	12,000	17,566	27,152
Bowie.....	Fort Worth, Tex.....	June 11	July 18	July 24	2,827	19,318	24,237	27,152
Cody.....	Denning, N. Mex.....	do.....	do.....	July 20	6,193	25,889	26,536	27,152
Doniphan.....	Fort Sill, Okla.....	do.....	July 17	July 25	.....	14,686	26,613	27,152
Freemont.....	Palo Alto, Calif.....	June 30	July 26	July 24	(3)	1,431	1,839	27,152
Greene.....	Charlotte, N. C.....	July 12	July 18	July 20	2,025	14,820	30,395	30,395
Hancock.....	Augusta, Ga.....	June 21	do.....	July 19	.....	13,856	27,596	27,596
Kearney.....	Linda Vista, Calif.....	May 24	July 17	July 23	.....	964	7,162	27,152
Logan.....	Houston, Tex.....	June 11	July 18	July 24	3,418	17,051	23,105	27,152
McClellan.....	Anniston, Ala.....	June 21	June 18	July 20	10,257	34,823	35,838	35,838
MacArthur.....	Waco, Tex.....	June 11	July 17	do.....	6,193	25,195	25,195	27,152
Sevier.....	Greenville, S. C.....	June 21	July 18	July 16	10,017	26,058	35,373	35,373
Sheridan.....	Montgomery, Ala.....	do.....	do.....	July 20	7,120	21,365	27,588	27,588
Shelby.....	Hattiesburg, Miss.....	July 12	do.....	July 21	6,193	15,114	23,126	30,762
Wadsworth.....	Spartansburg, S. C.....	June 21	July 17	July 19	.....	32,889	36,764	36,764
Wheeler.....	Macon, Ga.....	do.....	July 18	July 18	.....	24,695	24,695	27,152
Total.....	.....	.....	.....	.....	54,283	294,723	392,789	468,684

¹ Temporarily abandoned; work resumed Sept. 17.

Arrival of troops at National Guard camps on—

Sept. 1, 1917.....	39,998
Sept. 21, 1917.....	155,860
Nov. 30, 1917.....	406,894

NOTE.—The arrival of small numbers of National Guard troops at the various camps, exclusive of troops for guard duty, began about Aug. 20, 1917. The capacity of National Guard camps is dependent upon the number of tents pitched in each regimental area and is therefore a variable quantity. The numbers given in the above table are based upon the tables of Army organization of May 3, 1917, which were used in the designing of these camps. Complete preparation for receipt of troops included the construction of mess halls, latrines, water supply and distribution, and storehouses for each unit. On Jan. 22, 1918, the total summer capacity as determined by the capacity of the mess halls, latrines, shower baths, and storehouses so these camps was 613,692.

SECTION 18.

COMMENTS ON THE WORK OF THE CANTONMENT DIVISION.

CONTRACTS FOR EMERGENCY CONSTRUCTION.

The features of the standard Contract for Emergency Work are discussed elsewhere in this report.

Cantonment design was in an incomplete stage when it was necessary to start construction. It was then realized that many additions to and changes in plans would be required. Some features that at first seemed necessary were omitted in the early construction period because of lack of funds. If complete plans and specifications had been available it would have been impossible, under war conditions, for any competent contractor to have estimated accurately the cost of the work.

A peculiarity of ordinary methods of Government construction, unlike private work, is that no one is authorized to make adjustments and it would have been impracticable under a lump sum or unit

price form of contract, or one differing materially in form from that adopted to arrange for necessary adjustments due to changes of plans or specifications.

The average fee received by the contractors for their work on cantonments was less than 3 per cent. This is as low a fee as the Government could reasonably expect, and apparently was satisfactory to the contractors. The delays in paying the contractors promptly during the early periods of the work were unfortunate. Other delays in payment occurred in many instances from misunderstandings and unfamiliarity with Government auditing requirements. Most of the Government payments were, however, made promptly.

ENGINEERING.

The method generally adopted of making only the typical plans in Washington was the only one under which the field work could have been done within the available time. The standards adopted were from the best engineering practice and could be applied to construction work without waste of time or money on nonessential details. In many cases decisions had to be made without precedent. This necessitated knowledge, judgment, and experience. Energy and boldness were shown by the engineers in quickly conceiving the plans and in accomplishing their prompt execution.

CONSTRUCTION.

The placing of competent men in charge of each project and giving them broad general instructions and full authority over the work; the selecting of experienced contractors; and the giving to superintendents and contractors the assistance of expert advisory engineers and town planners was in line with the general policy for emergency construction work approved by the Government.

Many difficulties were met in organizing administration and construction forces of the necessary size. There were no contracting organizations of sufficient size to undertake the work that was planned and, as those used were organized under the stress of war-time conditions, it was difficult to obtain efficiency. This organizing entailed some lost motion, but, considering the work as a whole, the efficiency was apparently no lower than might reasonably have been expected from the prevailing conditions.

MATERIAL.

The methods adopted for locating and purchasing, or otherwise acquiring, all the needed materials proved effective. The procurement of some of these materials in quantity, through the medium of representatives of groups of manufacturers in Washington, was

advantageous from the standpoint of speed. It distributed orders according to the existing facilities for filling them and prevented confusion and congestion in the material markets, which would have delayed deliveries. It is believed that the prices obtained by this substitution of cooperation for competition were as low as could otherwise have been obtained.

The distribution of materials was difficult and many unusual construction problems arose in the quick placing of the large quantities that often arrived in a short period of time.

It was decided to give the constructing quartermasters authority to purchase materials locally to meet emergency needs. This was necessary to avoid delays due to lack of supplies.

LABOR.

Difficulties developed in transporting, housing, and feeding the army of mechanics and laborers used on this construction work. The chief grievance of the workmen seems to have arisen from the failure of some contractors to realize the necessity of good board and comfortable lodging.

In general labor showed inefficiency and unreliability and endeavored to exact wage increases without regard to the effects of such action. The Government's use of overtime and Sunday work facilitated this action. The effect of excessive hours of work was shown in greater labor inefficiency and instability, and it is doubtful whether the use of Sunday work advanced construction. It is stated that in England better results were obtained by allowing Sundays for rest and recreation.

The original method of procuring labor, allowing each contractor to assemble his own forces by any possible means, proved unsatisfactory. It caused competition between contractors and disturbance in the labor market, increased wages beyond reasonable limits without accomplishing the ends desired, and created general dissatisfaction. The labor leaders were not slow to take advantage of this situation and were able to play one contractor against another at increased cost to the Government.

Contractors and constructing quartermasters stated, in general, that in their opinion some agreement similar to the Baker-Gompers labor agreement was necessary, and that it aided in preventing strikes and labor troubles during the war emergency. It is unfortunate that the agreement made was not more definite and that a strong Government labor policy was not adopted at the beginning of the construction work and administered by a proper central agency with ample powers granted it by Congress to procure and allot labor essential for Government work.

COST OF CANTONMENTS AND CAMPS.

The cost of the original construction was high compared to like construction under prewar conditions.

The Board of Review has made a study of the actual costs as compared with estimated prewar costs with interesting results. These are given elsewhere in this report. They indicate that the excess costs on this work due to the war emergency are not so large as is generally supposed. This is partly due to the fact that material and labor costs have since increased. The cost on war work of inefficiency and of overtime may be considered as money paid for speed. Those who have charged undue inefficiency and mismanagement in this work have, it is believed, not fully studied and appraised the real facts and the great difficulties attending the undertakings.

Due to the plan adopted, and also owing to the large amount of work, the overhead administrative costs were but a small percentage of the total cost.

The cost, as estimated May 26, 1917, of building cantonments, with wooden barracks, water systems, sewers, sewage disposal, roads, hospitals, etc., to accommodate 1,103,496 men was \$192,393,200, which would average 32 divisional cantonments for about 35,000 men each. On this basis the 16 cantonments which were built should have cost in round figures \$96,700,000, while they actually cost as of December 31, 1917, \$143,000,000. In considering these figures the following facts should be given due consideration:

(a) When the cantonment program was undertaken in June, 1917, this full amount had not been appropriated. The Secretary of War first authorized the construction of the 16 cantonments, and, on July 13, 1917, the 16 National Guard camps. The authorizations for the cantonment construction eliminated everything not then deemed essential to the health of the men; and an even more drastic cut was made in the case of the National Guard camps. In these latter the troops' quarters consisted of tents with wooden floors, wooden buildings being constructed for the kitchens, mess halls, and storehouses only. Latrines were used in place of sewers and water-closets, and a more limited water supply per capita was furnished. It was necessary later to supply many of these omitted construction items.

(b) Many changes and modifications of plans necessitated by increased size of the Army units were made during construction and added to the difficulties and costs. These included additional hospital facilities, remount stations, bakeries, laundries, and other structures.

The cost of the original 32 cantonments and camps, as of December 31, 1917, when all the contracts were substantially completed, is reported as follows:

TABLE 12.—*Cost of original National Army cantonments and National Guard camps.*

Name.	Location.	Cost.
NATIONAL ARMY CANTONMENTS.		
Custer	Battle Creek, Mich.	\$8,861,249.60
Devens	Ayer, Mass.	10,056,344.78
Dix	Wrightstown, N. J.	9,611,105.08
Dodge	Des Moines, Iowa.	6,802,572.88
Funston	Fort Riley, Kans.	9,735,519.61
Gordon	Atlanta, Ga.	7,478,402.54
Grant	Rockford, Ill.	8,641,261.36
Jackson	Columbia, S. C.	9,016,252.11
Lee	Petersburg, Va.	11,747,748.08
Lewis	American Lake, Wash.	8,035,694.15
Meade	Admiral, Md.	11,227,607.00
Pike	Little Rock, Ark.	8,777,937.44
Sherman	Chillicothe, Ohio.	9,442,017.61
Taylor	Louisville, Ky.	6,456,906.54
Travis	San Antonio, Tex.	6,523,384.41
Upton	Yaphank, N. Y.	10,824,646.23
Total (16 cantonments)		143,038,649.42
NATIONAL GUARD CAMPS.		
Beauregard	Alexandria, La.	2,659,198.61
Bowie	Fort Worth, Tex.	2,246,351.11
Cody	Deming, N. Mex.	2,539,900.40
Doniphan	Fort Sill, Okla.	2,990,908.83
Fremont	Palo Alto, Calif.	2,051,771.33
Greene	Charlotte, N. C.	3,225,245.50
Hancock	Augusta, Ga.	1,970,663.65
Kearney	Linda Vista, Calif.	3,015,612.67
Logan	Houston, Tex.	1,969,361.52
MacArthur	Waco, Tex.	2,146,264.06
McClellan	Anniston, Ala.	3,200,860.06
Sevier	Greenville, S. C.	1,778,832.68
Shelby	Hattiesburg, Miss.	3,384,804.22
Sheridan	Montgomery, Ala.	1,872,802.04
Wadsworth	Spartanburg, S. C.	2,166,402.02
Wheeler	Macon, Ga.	2,090,820.66
Total (16 camps)		39,307,812.19
Grand total		182,346,461.61

Freight charges are not included in the foregoing table of costs. Except for local shipments, these were handled and paid by a special bureau in Washington, so that the Government might take advantage of the land-grant rates. The zone finance officer, in charge of transportation disbursements, has stated that no separation of railroad freight and other transportation charges was made. His records show the transportation charges on the construction of the National Army cantonments and embarkation camps, up to December 31, 1918, as \$5,940,940.29. In the case of the National Guard camps no statement covering transportation paid on materials was obtainable, as such charges were merged with other costs.

The total costs and the per capita costs of the cantonments and of the camps show differences which are apparently not due wholly to varying efficiency of work. They are caused by unlike conditions as to remoteness from labor centers, difficulties in handling material and obtaining labor, topography, soil, weather conditions, etc.

ACCOUNTING.

The field accounting was one of the most difficult tasks. The civilian personnel was under the regulations of the Civil Service Commission, whose eligible lists were inadequate to supply the demands for qualified accountants, timekeepers, and material inspectors. The field forces sometimes expanded as much as 5,000 men in a week, and clerical help could not be properly trained quickly enough to handle the large amount of timekeeping and pay rolls. The division auditors deserve much credit for their success in handling the work under such trying conditions.

A conflict of authority, which caused some trouble, early arose in the field between the constructing quartermasters and the field auditors. It was apparently due to the following causes:

(a) Uncertainty as to the intent of the letter of May 30, 1917, from the Secretary of War to the Quartermaster General.

(b) The appointment of the chief of the accounting division as contracting officer by the chief of the Cantonment Division, who seemingly construed this letter to mean that the authority of the accounting division would be supreme as to the interpretation of the contract and the expenditure of funds in the field.

(c) The organization plan, submitted to the officer in charge of the Cantonment Division by the committee on emergency construction of the General Munitions Board and adopted by him, which unfortunately set up two independent lines of communication between the field and the central office at Washington.

The situation above mentioned was remedied later by transferring the authority of the contracting officer to the chief of the Cantonment Division and by giving the constructing quartermaster full charge of all field construction operations.

In general the standards and regulations instituted by the Instructions to Field Auditors were effective in handling the construction accounts, but the field auditor had to use his own accounting knowledge and common sense to secure satisfactory results.

The completion reports from the various cantonments show general agreement, with divergencies of opinion on some accounting matters, especially with regard to the keeping of time and pay rolls. In some cases the opinion was expressed that the contractor should keep the accounts, but in other cases, where the contractor had the accounting of the time and pay rolls, it was thought desirable to transfer this work to the Government officials. As the Government must check all expenditures, review indicates that the field auditor's department should have charge of time accounting and making of pay rolls. Under such plan the auditing would be done along with the construction work and effect a considerable saving to the Government

by avoiding the duplication of the accounting work by the contractor and the field auditor.

The difficulties of the later accounting work are dealt with in Part III, in the section on "Field organization."

SUSPENSIONS FILED AGAINST CANTONMENT DISBURSING OFFICERS.

Section 1191, Revised Statutes of the United States provides:

All officers of the Quartermaster, Subsistence, and Pay Departments, the chief medical purveyor and the assistant medical purveyor, and all storekeepers shall, before entering upon the duties of their respective offices, give good and sufficient bonds to the United States in such sums as the Secretary of War may direct, faithfully to account for all public moneys and property which they may receive.

On December 12, 1916, pursuant to these requirements, the Acting Secretary of War fixed the amount of bonds to be furnished by officers of the Quartermaster Corps who were required to be bonded as follows: Colonels, \$10,000; lieutenant colonels, \$10,000; majors, \$10,000; captains, \$10,000; first lieutenants, \$5,000; second lieutenants, \$5,000; quartermaster agents, \$5,000.

PENALTY.

The manual for the Quartermaster Corps, United States Army, states:

SEC. 537. Accounts in the Treasury are never closed. In neither the legal nor mercantile sense of the terms is an account between the Government or one of its officers ever finally adjusted, nor is his official bond ever canceled or surrendered.

SEC. 1965. All persons charged by law with the safekeeping, transfer, or disbursement of public moneys are required to keep accurate entry of each sum received and of each payment or transfer.

SEC. 1966. Every officer or agent of the United States who, having received public moneys which he is not authorized to retain as salary, pay, or emolument, fails to render account for the same as provided by law shall be deemed guilty of embezzlement and shall be fined in a sum equal to the amount of money embezzled and imprisoned not more than ten years.

An officer is required to render a monthly account current to his chief of bureau.

ADMINISTRATIVE EXAMINATION.

The law requires—

SEC. 1998. The chief of the bureau to which accounts pertain will cause each account current, with its accompanying papers, to be examined and transmitted to the Treasury Department with his decision indorsed thereon within 60 days from the date on which such account was received at his office. He will bring to the notice of the Secretary of War all matters of account that require or merit it. When a suspension or disallowance is made, the bureau will notify the officer that he may have the opportunity to submit explanations or take an appeal to the Secretary of War.

SEC. 1999. Such errors or irregularities as are found in the administrative examination of the quartermaster's money account in the office of the Quartermaster General are reported to the quartermaster for such action as is necessary toward adjustment. The quartermaster's reply to such report is transmitted by the Quartermaster General to the Auditor for the War Department when necessary for consideration in the settlement of such accounts.

Upon receipt of the settlement of differences from the auditor the quartermaster should immediately take action toward causing the removal of the suspensions or correction of other irregularities reported therein, and reply direct to the auditor, stating action taken. * * * If additional evidence satisfactory to the auditor can not be furnished, collection of the overpayment should be made from the payee, if practicable, or from the responsible officer, if any; otherwise refundment shall be made by the quartermaster.

The accounts current made by disbursing officers went to the Quartermaster General's office, now the office of the Director of Finance, without passing through the Construction Division. The office of the Director of Finance, which is in no way responsible for construction, has no special interest in closing the accounts of disbursing officers, which are often delayed a year after the completion of the work. It is now difficult if not impossible, after such lapse of time, to secure all required receipts and other supporting documents.

On December 31, 1918, suspensions or disallowances were standing against every disbursing officer on the original 32 cantonments and camps. Many of these were inevitable under the emergency conditions of this construction. The principal causes for suspensions are payments not properly supported by receipts, improperly signed receipts, clerical errors in pay rolls or vouchers, and contracts not filed with auditors.

With reference to that last-mentioned cause it is to be noted that the contracts for the original construction work were filed in the Quartermaster General's office and not with the Cantonment Division.

The suspension accounts in the Cantonment Division, as of September 30, 1918, arising from alleged irregularities in detail work, are as follows:

Project.		Project.	
Camp Bowie, Tex.....	\$64, 447. 95	Camp Upton, N. Y.....	\$3, 731, 197. 94
Camp Devens, Mass.....	66, 272. 14	Camp Kearney, Calif.....	158, 199. 81
Camp Jackson, S. C.....	171, 983. 73	Camp Gordon, Ga.....	92, 365. 69
Camp Sherman, Ohio....	169, 180. 65	Camp Meade, Md.....	3, 533, 974. 01
Camp Sevier, S. C.....	33, 543. 26	Camp Sheridan, Ala.....	516, 823. 77
Camp McClellan, Ala.....	390, 198. 48	Camp Logan, Tex.....	45, 088. 31
Camp Lee, Va.....	148, 852. 72	Camp Grant, Ill.....	2, 183, 236. 62
Camp Travis, Tex.....	754, 141. 32	Camp Beauregard, La....	286, 021. 26
Camp Fremont, Calif.....	927. 50	Camp Dix, N. J.....	98, 687. 66
Camp Pike, Ark.....	1, 726, 491. 85	Camp Merritt, N. J.....	37, 879. 84
Camp MacArthur, Tex....	723. 75	Camp Lewis, Wash.....	140, 371. 29
Camp Wheeler, Ga.....	20, 152. 88	Camp Hancock, Ga.....	6, 730. 01
Camp Funston, Kans.....	270, 120. 69	Camp Travis, Tex.....	522. 71
Camp Wadsworth, S. C...	49, 750. 86	Camp Benj. Harrison, Ind.	161, 929. 58
Camp Taylor, Ky.....	24, 789. 54	Camp Jackson, S. C.....	134, 403. 75
Camp Little Silver, N. J..	30, 649. 73	Camp Fort Oglethorpe, Ga	528, 679. 06
Camp Newport News, Va.	1, 199. 10		
Camp Custer, Mich.....	1, 058, 594. 28	Total.....	16, 949, 280. 82
Camp Cody, N. Mex.....	311, 149. 08		

The causes stated for these suspensions and the amounts are as follows:

No receipts of any kind (employees).....	\$1, 452, 045. 47
No pay rolls.....	4, 008, 199. 42
Material:	
No bills.....	3, 471, 623. 84
Bills not receipted.....	2, 163, 735. 03
Vouchers not signed.....	87, 182. 13
Vouchers not filed.....	1, 335, 731. 15
	<hr/> 12, 518, 517. 04
Improperly signed pay receipts.....	3, 069. 56
	<hr/> Total payments not properly supported by receipts..... 12, 521, 586. 60
Clerical errors:	
Pay rolls.....	\$37, 990. 28
Vouchers.....	269, 925. 84
	<hr/> 307, 916. 12
Contracts not filed with auditor.....	4, 119, 778. 11
	<hr/> Total..... 16, 949, 280. 83

This amount is about 9 per cent of the total expenditures on these 35 projects.

As the instructions in the Quartermaster's Manual were definite as to securing proper supporting papers it is not clear how so many omissions could have occurred. In commercial transactions such difficulties are usually adjusted between the interested parties, but in Government transactions and accounting no official has such authority and every technical requirement of the regulations must be satisfied.

QUALITY OF CONSTRUCTION.

The board has studied cantonment plans and specifications and inspected the type and quality of construction used in a number of these projects. Its conclusions thereon are as follows:

All facilities that were important and reasonably warranted were furnished.

The general health, comfort, and convenience, and the physical, mental, and social welfare of the troops were provided for as fully as was practicable.

The barracks were of modern housing type, reasonably well provided with ventilation, window screens, heat, and electric light.

An adequate supply of pure water was furnished for drinking and bathing, with modern plumbing and sewerage systems.

The kitchen, bakery, and steam laundry equipments were first class.

Facilities furnished for reading, recreation, amusement, and comfort included libraries, theaters, and post exchanges.

The civic improvements equaled in character those of many suburban cities and included walks, paved roads, street lighting, and fire protection. In some cantonments the buildings were painted. This added to the life and decidedly improved the appearance of the structures.

The difference between the construction standards used for the National Army cantonments and those of the National Guard camps was due to the fact that the former were built for training successive contingents of troops throughout the war and as possible permanent camps. In consequence they were constructed of wood and fully equipped. The latter were built for temporary occupancy only by the National Guard troops and would probably not be much needed after they went overseas. The sites were chosen for favorable living and climatic conditions, usually in the Southern States, and tents instead of wooden barracks were used.

SPEED OF CONSTRUCTION.

This board shares the generally expressed opinion that the cantonments and camps were built with remarkable speed.

The designs were as economical as the requirements and as due provision for the health and reasonable comfort of the troops permitted.

Delays occurred, due to lack of competent workmen and mechanics. Some loss of time was caused by lack of proper supervision of labor. Most of the delays were due to unavoidable causes and emergency conditions, and all were so overcome that the construction was ready as and when needed.

As has elsewhere been pointed out, in reviewing war results obtained and difficulties overcome by the industrial home army or the overseas combatant army, the essential test is believed to be the degree of success achieved and not the size of the organization or of its pay-roll. In order to have the necessary workmen for this construction on hand when needed, it was impossible to avoid having and paying for a labor surplus when progress was slowed up by lack of materials or other causes. It is reported that the contractor on one of the cantonments stated that he could increase the speed or output 25 per cent if he doubled the working force and that he was at once instructed to do so. This instance shows how cost, the usual criterion of economy, had to be subordinated to speed in order to complete the cantonment work on time. For these reasons the board believes that, in a review of the cantonment and camp work done in 1917, for the tests of speed, quality, and cost must be substituted speed and quality.

The reported total cost of the 16 National Army cantonments and camps as of December 31, 1918, was somewhat under \$200,000,000

and the average daily cost of the war to the United States was about \$30,000,000. If the completion of these cantonments and camps in time to receive the Army in September, 1917, and to house it during the extreme winter of 1917-18 shortened the war by only one week their total cost was saved. If it shortened the war by one or two days, the total excess costs paid for speed were saved. These figures include no allowance for any saving of soldiers' lives.

The board is of the opinion that had construction not been pushed at maximum speed cold weather would have interfered with and caused much delay in this housing work, which, with the difficulty of training troops in severe winter weather, would have greatly delayed the mobilization, training, and embarkation of American troops for France, with results that might have seriously influenced the issue of the war.

PART III.

CREATION, HISTORY, ORGANIZATION, PERSONNEL, DUTIES, METHODS, PROCEDURE,
AND RESULTS OF THE CONSTRUCTION DIVISION OF THE ARMY AND ITS SYSTEM
OF DOING WORK.

SECTION 19.

REORGANIZATION OF CANTONMENT DIVISION.

AUTHORITY.

On October 5, 1917, The Adjutant General issued the following order to the Quartermaster General of the Army:

Subject: Emergency construction.

1. The Secretary of War directs that all building construction rendered necessary in the United States by the present emergency and provided for by existing or pending appropriations shall be executed by the Quartermaster General's Department under the direction of Col. I. W. Littell.

2. If any special case seems to any head of a department an exception to this rule the Secretary of War will pass on it separately.

It had been the intention to disband the Cantonment Division after the completion of its cantonment and camp construction, but this order changed its status and necessitated its reorganization and enlargement.

On October 10 the Quartermaster General issued an office order directing that, in compliance with the instructions of the Secretary of War of October 5, the construction and repair division of the Quartermaster General's office be abolished as a division and, with the officer in charge, the records, personnel, etc., pertaining to such division of the Quartermaster General's office be transferred to the Cantonment Division as a branch thereof.

As extensions were being made continually to all of the cantonments and camps, the heads of the Cantonment Division found it necessary again to call on civilian experts to join the division; some to take part in the field work and others to assist in Washington.

The following men were called to active service or commissioned and assigned to supervising office duty at headquarters in Washington:

Maj. L. L. Calvert.....	Aug. 14, 1917
Maj. H. S. Crocker.....	Oct. 19, 1917
Maj. Warren R. Roberts.....	Dec. 23, 1917
Maj. J. H. Alexander.....	Jan. 10, 1918
Maj. O. P. Chamberlain.....	Jan. 15, 1918
Maj. G. B. Walbridge.....	Feb. 15, 1918
Maj. R. M. White.....	Feb. 15, 1918
Maj. C. C. Wright.....	Feb. 18, 1918

The principal changes made in the organization were as follows:

The completion of cantonment and camp work was placed in one section.

A new section was formed and placed in charge of Mr. Warren R. Roberts, later major, to execute the construction of projects such as terminals, supply depots, and the like.

A labor and statistics section was formed and placed in charge of Maj. J. H. Alexander, to supervise the coordination of labor rates and conditions on all construction of the Cantonment Division; to pass upon agreements in connection therewith; to deal with labor-union officials and with the Cantonment Adjustment Commission of the War Department; and to supervise compilation of labor rates, conditions, and agreements.

A Government equipment and material section was formed and placed in charge of Maj. E. C. Stockdale. It had charge of the transfer and disposition of Government-owned material which remained on hand at the completion of construction work and which was not required for maintenance purposes or was unfit for the use of troops. It made decisions as to the exercising of options for the purchase of equipment under the rental clause of the standard Contract for Emergency Work, arranged for rental of equipment which it was difficult to buy, and kept records of idle equipment which could be transferred and utilized on other projects.

Construction increased so rapidly that another section was formed and placed in charge of Maj. O. P. Chamberlain. This had charge of Signal Corps construction, including storehouses and aviation fields, and of housing for the Shipping Board at approximately 20 different points.

The field organizations under the constructing quartermasters remained practically the same. The supervising constructing quartermasters, originally assigned to act as district field supervisors, were required to take a more active part at Washington, to assume responsibility for a group of projects, and to direct their field operations from the Washington office, reporting to the section chiefs.

On October 16, 1917, an office order was issued directing that all project correspondence and instructions be handled through the proper supervising constructing quartermaster, who thus became the point of contact between the field and the central office.

On February 9, 1918, General Order No. 14 was issued, of which section 5 was as follows:

Army operations division.—This division shall have the cognizance and control of Army operations under an officer who is designated as the director of operations, who shall be an assistant to the Chief of Staff. The duties of this division shall include the following:

* * * * *

(c) The supervision and coordination of camp sites, cantonments, Army posts, hospitals, sanitation, construction plans and projects, as the same relate to all branches of the Army.

On February 12, 1918, a memorandum to The Adjutant General by the Acting Chief of Staff stated that, by direction of the Assistant Secretary of War, Brig. Gen. Isaac W. Littell, National Army, would be relieved from the Cantonment Division and appointed a brigadier general, Quartermaster Corps, Regular Army, and retired from active service. In compliance therewith, Gen. Littell was relieved on February 18, 1918, and Lieut. Col. R. C. Marshall, jr., was assigned to take charge of the Cantonment Division.

On February 19, 1918, The Adjutant General notified the Quartermaster General of the Army that the Secretary of War had issued an order stating:

The Cantonment Division will hereby constitute a part of the office of the Chief of Staff, in connection with section 3, paragraph 5, General Order No. 14, February 9, 1918, now in process of issue.

On February 19, 1918, the Assistant Secretary of War approved a memorandum requesting that Col. Marshall be designated as contracting officer to act in all the outstanding unfinished contracts which were executed by Gen. Littell as contracting officer while in charge of the Cantonment Division.

SECTION 20:

ORGANIZATION OF CONSTRUCTION DIVISION OF THE ARMY.

On March 13, 1918, the Secretary of War, issued through The Adjutant General of the Army, an order to the officer in charge of cantonment construction which changed its name to the Construction Division. This order read as follows:

Under the authority granted in section 1 of the act of Congress "to authorize the President to increase temporarily the military establishment of the United States," approved May 18, 1917, the President directs that the Cantonment Division of the Quartermaster Corps (including as a part thereof the Construction and Repair Division of the Quartermaster Corps) now operating as a part of the office of the Chief of Staff, shall hereafter be called the Construction Division and shall be temporarily increased during the present emergency so as to consist of, including commissioned personnel in the Quartermaster Corps, Regular Army, National Guard, National Army, Reserve Corps, heretofore authorized, including officers of other arms, staff corps and departments who may be detailed for duty with the Construction Division other than liaison duty:

Brigadier general.....	1
Colonels.....	13
Lieutenant colonels.....	22
Majors.....	240
Captains.....	686
First lieutenants.....	347
Second lieutenants.....	98

* * * The total herein authorized includes all officers now on duty with the Quartermaster Corps or heretofore authorized under existing law for the performance of duties allotted to the present Cantonment Division, including the operation of utilities and the maintenance and repair of public buildings at military posts, camps, and cantonments. It does not include quartermasters of permanent posts who may operate utilities and supervise maintenance and repair work in addition to their duties as supply officers.

The following is hereby authorized as maximum civilian personnel to be employed by the Construction Division, including those employed at present:

Technical.....	479
Stenographers and typists.....	255
Clerks.....	250
Messengers.....	83
Blue printers.....	17
Accountants.....	50
Contract clerks.....	4

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* * * In view of the existing order of the Secretary of War, that all building construction rendered necessary in the United States by the present emergency shall be executed by the Construction Division unless especially excepted by the Secretary of War, all commissioned, civilian personnel of the Ordnance Department and Signal Corps, heretofore employed exclusively on construction work and no longer needed in these corps and departments will be considered available for assignment to the Construction Division as a part of the personnel herein authorized, upon the request of the officer in charge of Construction Division, but no officer of the line of the Regular Army, who may be detailed in any of these corps and departments shall be assigned to the Construction Division under this authority. Such officers and civilians of the present Construction Divisions of these corps and departments who are not transferred or assigned to the Construction Division, and who are no longer needed for the construction work in their own corps or departments will be disposed of by absorption in other branches of their corps or departments, by relief from detail, by transfer to other arms or branches, by relief from active duty or by discharge, as may be determined by the Chief of Staff under the recommendation of the chief of the corps or department concerned.

The officer in charge of Construction Division is hereby authorized to take the necessary steps to secure the additional commissioned and civilian personnel herein authorized, provided it shall be called only when needed, and that the personnel shall be reduced whenever it exceeds the requirements. The additional officers herein authorized will be obtained as provided * * * by the act of May 18, 1917.

On April 10, 1917, by order of the Secretary of War, sent from The Adjutant General of the Army to the officer in charge of Construction Division, the duties of the Construction Division were further extended as follows:

1. You are informed that all plans, specifications, and estimates for construction work will be prepared by or under the supervision of the Construction Division, upon general requirements given in advance by the bureau involved. All engineering services and services of contractors in connection therewith will be obtained by the Construction Division.

2. The Construction Division will see to it that the designs will fulfill in an efficient manner the general requirements laid down, and will be solely responsible for the execution of the construction work.

SECTION 21.

FIRST ORGANIZATION OF CONSTRUCTION DIVISION.

On April 19, 1918, an office order was issued by the officer in charge of the Construction Division reorganizing and dividing it into seven branches, as follows: Engineering, constructing, administrative, contracts, maintenance and repair, accounting, and materials.

The engineering branch, in charge of Col. F. M. Gunby; Lieut. Col. Lincoln Bush, assistant; Lieut. Col. C. C. Wright, executive officer. This branch was given supervision over the preparation of all plans and specifications for emergency construction, including buildings, water and sewer systems, roads, walks, wharves, drainage, heating, lighting, power, plumbing, railroads, and docks. It was also given charge of the preparation of cost estimates and bills of materials entering into construction.

As the pressure for speed was not so great as during the summer of 1917, and as in most cases data could be secured, engineering advanced from the method of making only typical plans to making general plans for each project.

About that time an expediting section was organized and charged with the responsibility of having the engineering work for each project performed expeditiously and in proper sequence. In addition to being responsible to higher authority for cost estimates and requirements the engineering branch was also responsible for the allotment of funds to the various projects. This was the limit of its control of financial matters. This branch was divided into 15 sections, as follows:

Section.	In charge.
(a) Architectural work.....	Lieut. Col. F. B. Wheaton.
(b) Estimates.....	Maj. H. S. French.
(c) Camp planning.....	Maj. George Gibbs, jr.
(d) Water supply.....	Lieut. Col. D. H. Maury.
(e) Fire protection.....	Mr. W. M. Johnson.
(f) Electric equipment.....	Mr. J. S. Henderson.
(g) Illumination.....	Mr. A. L. Pearson.
(h) Heating and plumbing.....	Maj. L. H. Tripp.
(i) Expediting.....	Maj. H. J. Burt.
(j) Roads and sanitation.....	Maj. L. S. Doten.
(k) Schedule.....	Mr. G. G. Will.
(l) Refrigeration.....	Mr. L. R. Phillips.
(m) Special studies.....	Mr. H. M. North.
(n) Mechanical engineering.....	Mr. J. B. Blake.
(o) Care, efficiency, and track work.....	Mr. A. F. Dershimier.

The constructing branch, formerly the construction branch, in charge of Cols. M. J. Whitson and P. Junkersfeld, was reorganized and enlarged on a different plan whereby several classes of work were segregated and placed under separate sections. Its scope was un-

changed as it continued in charge of all permanent and temporary construction, but the work was carried on by five sections, instead of three sections as previously, as follows:

Section.	In charge.
(a) Camps, hospitals, quartermaster shops	Lieut. Col. O. P. Chamberlain.
(b) Regular Army Coast Artillery	Maj. H. W. Lockett, assisted by Maj. J. B. Coleman.
(c) Storage and traffic, terminals, lighters, ware- houses.....	Lieut. Col. R. M. White, assisted by Maj. Frank B. Maltby.
(d) Ordnance depots, manufacturing and proving plants.....	Lieut. Col. G. F. D. Trask, as- sisted by Maj. B. B. Lathbury.
(e) Signal Corps plants and depots, housing, unclas- sified.....	Lieut. Col. G. B. Walbridge, as- sisted by Maj. G. W. Carlton.

Other sections of this branch were:

Protection and investigation	Lieut. Col. Philander Betts.
Government equipment and material	Lieut. Col. E. C. Stockdale.

A supervising constructing quartermaster, recommended by the section chief, maintained the connection between field and office and handled a group of projects of similar character or location. This plan increased the responsibility and authority of the section chiefs and their supervising constructing quartermasters and the centralization of authority in Washington.

The administrative branch, in charge of Maj. J. H. Alexander, under this reorganization, appears for the first time as a separate branch. With the labor and statistics section, it had charge of affairs of supervision, development and perfecting of administration and operation, and coordinating the activities of the various branches and sections of the construction division. It was divided into five sections, as follows:

Section.	In charge.
(a) Personnel.....	Maj. G. H. Thompson.
(b) Mail and record, miscellaneous.....	Capt. W. G. Maupin.
(c) Information.....	Capt. A. H. Erck.
(d) Labor and statistics.....	Maj. H. F. Mayer.
(e) Stenographic and property.....	Mr. A. B. Moreland, chief clerk.

The contracts branch was enlarged under the reorganization, Maj. Evan Shelby remaining in charge, and, as formerly, was divided into two sections—the contract section, in charge of Maj. Shelby, and the insurance section, in the charge of Mr. Leo J. Wolfe. After the formation of the construction division the contracts branch established its own file for original copies of contracts. Original contracts had previously been filed in the office of the Auditor of the War Department and in the office of the Quartermaster General, although this division, from the beginning, passed on contracts and subcontracts

made by the Government, and upon the form and premium rate of fire, accident, and workmen's compensation insurance.

The maintenance and repair branch, in charge of Lieut. Col. C. D. Hartman, was formed from the construction and repair division of the Quartermaster General's office. Office Order No. 106, dated October 10, 1917, abolished the construction and repair division of the Quartermaster General's office and transferred its records, personnel, etc., to the cantonment division.

The duties of this organization, prior to its transfer to the Construction Division, had included construction and repair work at Regular Army Posts, renting of buildings, leasing of land, preparation and custody of historical records and other matters of miscellaneous character. The old department continued with the construction, repair and operation of utilities at Army posts after Col. Littell, who, prior to the war, had been in charge of the construction and repair division of the Quartermaster General's office, was detailed as chief of the Cantonment Division. Upon completion of the cantonments and camps they were turned over to the construction and repair division to operate and maintain.

The duties of the maintenance and repair branch were as follows:

Maintenance and repair at permanent and temporary Army posts and camps and other places where Government construction work was being done, carrying out plans prepared by the engineering branch and by itself connected with matters of maintenance and repair. It corresponded with local offices in charge of maintenance work and in regard to plans and all matters incident to same and to the work of the branch, and allots funds in connection with its activities.

It was divided into the following sections:

Section.	In charge.
(a) Technical.....	Maj. D. S. Clinton.
(b) Mechanical.....	Capt. George A. Knight.
(c) Reservation.....	Capt. E. M. Aten.

The accounting branch had been undergoing reorganization since January, 1918. The work had been handled prior to that time in a manner similar to that of cantonment accounting. On January 19, 1918, Mr. Charles Neville, later colonel, Quartermaster Corps, member of the American Institute of Accountants, who had been the field auditor of one cantonment and five National Guard camps, undertook this reorganization work. He was assisted by Mr. William Whitfield, later captain, Engineer Corps, and Mr. Albert Moss, later major, Quartermaster Corps, both members of the American Institute of Accountants and former division auditors. The first work in the reorganization was the preparation of the Manual for Field Auditors, especial attention being directed to the standardization of accounting procedure and records at the various projects.

When the reorganization was decided upon it was expected that the unsettled business in the accounts of the original cantonments

and camps would be cleared up by Maj. Dempsey. He was, after brief service, transferred and sent overseas. This transfer left this work unfinished. The insufficient clerical force had not been able to do the accounting work at the Washington office. Some of this work is still unfinished.

The insurance business was transferred from the accounting division to the contracts division.

The organization, field accounting forces and accounting procedure did not follow the original plan. The field auditor was placed directly on the staff of the constructing quartermaster, to whom he reported and was responsible.

The accounting branch at Washington issued instructions through the Construction Division to the constructing quartermasters, and questions arising in the field in connection with accounting were submitted through the same channel.

The accounting branch was divided into 7 sections, as follows:

Section.	In charge.
(a) Traveling accountants.....	Mr. William Whitfield.
(b) Cost accounting.....	Capt. C. A. Duff.
(c) Funds.....	Lieut. R. E. Dudley.
(d) Field accounting.....	Mr. C. D. Block.
(e) Prior construction.....	Mr. E. F. Cassel.
(f) Personnel.....	Mr. C. D. Block.
(g) Miscellaneous.....	Mr. N. W. Phillips.

The materials branch, in charge of Col. J. N. Willcutt, Lieut. Col. J. N. Pease, assistant, continued with duties unchanged. These included the procurement, inspection, expediting and delivery of all materials mobilized through the Construction Division. It cooperated with various committees and other organizations formed for the purpose of stabilizing prices. Construction operations were carried on under this plan from April 19, 1918, until August, 1918. This branch was divided into two sections.

The procurement section, in charge of Maj. O. F. Noss, consisted of 11 departments, as follows:

Department.	In charge.
(a) Building materials.....	Capt. A. S. Dorsey.
(b) Steel.....	Capt. H. C. Bissell.
(c) Steam heating.....	Capt. W. H. Riblet.
(d) Electrical equipment.....	Capt. J. E. Erickson.
(e) Plumbing supplies.....	Capt. J. C. McCubbin.
(f) Water supply.....	Capt. M. O. Pinkham.
(g) Mechanical equipment.....	Capt. A. C. Nell.
(h) Stove and special equipment.....	Capt. E. W. Case.
(i) Fire protection.....	Capt. G. H. Litchfield.
(j) Hardware.....	Mr. A. P. Chandler.
(k) Paints and refrigeration.....	Mr. J. H. Prentiss.

The delivery section, in charge of Lieut. Col. H. S. Durant, assisted by Capts. J. M. Ritchie and A. B. Nash, comprised three departments, namely:

Department.	In charge.
(a) Transportation.....	Mr. C. E. Denny, assisted by Capt. F. M. Palmer.
(b) Inspection.....	Capt. F. W. Hatten
(c) Expediting.....	Mr. S. G. Stouch.

COMMENTS AND CONCLUSIONS.

In its efforts to carry out the order of the Secretary of War of April 10, 1918, that the Construction Division prepare all plans, specifications and estimates, the engineering branch centralized much of the engineering work at the Washington office. It made plans and specifications in detail only to find them often inapplicable to field conditions. Moreover, after authorizations and funds had been secured, it was often found that the cost of following the plans would exceed the appropriation. Time was lost, also, in revising the details prepared in the headquarters office and in securing approvals of such changes. The centralization increased the responsibility and authority of the construction branch and necessitated the exercise of more authority by the section chiefs and the supervising constructing quartermasters. This caused further centralization of activities in the Washington office.

In many cases the field engineering force was as capable of doing this project work as the staff at headquarters and also had the advantages of being on the ground, acquainted with the conditions and difficulties to be met and familiar with the local material market.

These conditions tended to cause friction and lost motion between the engineering and constructing branches, which were aggravated by the division of responsibility and the fact that the funds were obtained by the engineering branch and spent by the constructing branch.

The heads of these branches perceived the loss of speed entailed by this centralization and concluded to revert to the method of making only the typical plans and specifications at headquarters. This decision was put into practice. It effected a general improvement, better coordination between the engineering and materials branches, and a desirable reduction of the load on headquarters. In this way decentralization of activities was again accomplished.

The transfer of the construction and repair division of the Quartermaster General's office to the Cantonment Division proved beneficial. It placed the operation of the utilities under those who had designed and built them and were, in this case, best equipped to handle and maintain them.

SECTION 22.

PERSONNEL OF CONSTRUCTION DIVISION.

MILITARY PERSONNEL.

The Construction Division, as constituted at the date of the armistice, was composed of 1,429 officers and 12,353 civilians, a total of 13,782. Its office and field forces included many leading engineers, architects, and constructors who acted in consulting and advisory positions and as executives, department heads, constructing quartermasters, and supervising engineers. Many of these and of their assistants were drawn from organizations throughout the United States engaged in designing, building, and contracting work, and in the operation of public utilities. So far as the Board of Review has been able to ascertain, the personnel of no other corps or division of the Army contained such a large proportion of men who had, as measured by the prewar positions or earnings, been notably successful in their civilian professions. The schedule of officers and their former work, given several pages beyond, is inserted because of its interest in this connection.

During the entire war period all but twelve of the officers of the division were men drawn from civil life. Of these twelve, six were actively connected with the affairs of the Construction Division and six were constructing quartermasters who received other assignments before or at the completion of their first projects. Three of the twelve were with the division at the time of the armistice.

Of the officers from civil life it is stated that about 40 per cent came from the engineering and architectural professions and 60 per cent from construction and allied activities.

The authorized and actual strength of the commissioned and enlisted personnel of the Construction Division and their salaries and allowances on November 11, 1918, were as follows:

COMMISSIONED PERSONNEL.

	Authorized strength.	Actual strength.	Yearly salary.	Quarters, heat, and light. ¹	Total.
Brigadier general.....	1	1	\$6,000	\$1,260	\$7,260
Colonels.....	13	12	4,000	1,116	5,116
Lieutenant colonels.....	22	22	3,500	973	4,473
Majors.....	274	221	3,000	828	3,828
Captains.....	717	610	2,400	684	3,084
First lieutenants.....	548	263	2,000	540	2,540
Second lieutenants.....	300	300	1,700	396	2,096
Total.....	1,875	² 1,429			

¹ Figures assume the heating and lighting of 1 room, as, owing to the shortage of rooms in Washington during the period of the war, officers probably did not, on the average, occupy more than 1 room each.

² Of this number, 415 were located in the central office at Washington and 1,014 in the field.

ENLISTED PERSONNEL.

	Authorized strength.	Actual strength.	Monthly salary.
Quartermaster sergeants senior grade.....	152	33	\$81
Quartermaster sergeants.....	435	39	51
Sergeants first class.....	1,873	522	51
Sergeants.....	8,208	2,358	44
Corporals.....	2,394	784	36
Cooks.....	620	82	38
Privates first class.....	13,596	1,659	33
Privates.....	5,749	7,488	30
Total.....	33,027	12,965	.....

In addition to salary, enlisted men received board, quarters, clothing, and medical attendance.

All of the enlisted personnel in the field served in the maintenance and repair division of the Construction Division.

The following list gives the name and an outline of the prewar experience and business and professional status of a number of the officers who served with the Construction Division:

Brig. Gen. R. C. Marshall, jr., chief of the Construction Division of the Army.

Graduate of Virginia Military Institute, class of 1898. Served through the Spanish-American War as captain, 4th United States Infantry. Entered Regular Army second lieutenant, Coast Artillery Corps, February, 1902. Promoted captain, same corps, January 20, 1908. Detailed on special technical work in connection with manufacturing shops and other Army activities. Detailed to Quartermaster Corps January, 1915. Assigned to duty in office of Quartermaster General as officer in charge of construction, maintenance, and operation of all utilities at Army posts and stations. After the declaration of war, promoted through various ranks until June 26, 1918, when made brigadier general, National Army, president of the Army & Navy Cooperative Co.

Col. F. M. Gunby, officer in charge, engineering division.

Partner of Charles T. Main (former president of the American Society of Mechanical Engineers), and consulting engineer for textile mills and industrial organizations.

Col. M. J. Whitson, officer in charge, building division.

General contractor and consulting engineer, specializing in heavy construction and railroad building work in the United States and Canada.

Col. P. Junkersfeld, officer in charge, building division.

President Association of Edison Companies and assistant vice president Commonwealth Edison Co., Chicago, with supervision of engineering, construction, and operation, including allied interests having electric, gas, railway, and other properties in several States.

Col. E. Shelby, officer in charge, contracts division.

Member of the New York Bar, engaged in the practice of law.

Col. J. N. Willcutt, officer in charge, procurement division.

President of the firm of T. D. Willcutt & Sons, general contractors, Boston, Mass., builders of the Touraine Hotel, Boston, and addition to Harvard University.

Col. Joseph H. Alexander, officer in charge, administrative division.

Assistant to the president of the Cleveland Railways Co. Experienced in labor and transportation problems, electric railway management, and general construction.

- Col. Frank E. Lamphere, constructing officer, port development, Charleston, S. C.
Principal assistant engineer, Baltimore & Ohio Chicago Terminal Transfer Railway Co. An authority in Chicago on track elevation and grade separation work.
- Col. Millard A. Butler, constructing officer at Norfolk Quartermaster Terminal.
Chief engineer of the St. Paul Belt Line. Construction engineer for the Great Northern Railroad Co.
- Col. Lincoln Bush, at headquarters.
Chief engineer of the Lackawanna Railroad in charge of rehabilitation, including design and construction of large docks and terminals in the New York district. Inventor of the Bush train shed. As contractor, built the Scranton viaduct of the Lackawanna Railroad and other projects.
- Col. C. D. Hartman, officer in charge, maintenance and repair division.
Graduate of West Point Military Academy, class of 1908, Infantry branch. Quartermaster in field with troops, including service in the Philippines. Post quartermaster, including construction, operation, and maintenance. Constructing quartermaster for the Eagle Pass district.
- Col. Charles Neville, officer in charge, accounting division.
Partner, Neville, McIver, Barnes & Co., certified public accountants of Savannah, Ga.
- Col. George F. D. Trask, at headquarters.
Contractor. Built Washington & Alexandria Railroad and other construction undertakings, including work in Central America, Cuba, and Porto Rico.
- Lieut. Col. Philander Betts, at headquarters.
Chief engineer of the Public Utilities Commission, State of New Jersey. Consulting, constructing, and operating experience in public utilities.
- Lieut. Col. O. P. Chamberlain, at headquarters.
Vice president Delese & Shepard Co., Chicago, Ill., stone producers and street-paving contractors in Middle West. Experience in general railroad construction.
- Lieut. Col. Wm. Couper, constructing officer, north Camp Jackson, S. C.
Assistant engineer and superintendent in charge of lighterage and scow department of Pennsylvania Railroad Co.
- Lieut. Col. H. S. Durant, at headquarters.
Northwestern manager at St. Paul, Minn., of American Steel & Wire Co.
- Lieut. Col. W. L. Henwood, constructing officer, Delaware Ordnance Depot, Pedricktown, N. J.
Partner of Lathrop, Shea & Henwood, general contractors, New York and Scranton, Pa.
- Lieut. Col. Dabney H. Maury, at headquarters.
Consulting engineer specializing on water works, and for many years an engineer and operator of waterworks systems. Ex-president of the American Water Works Association.
- Lieut. Col. E. B. Morden, constructing officer, Philadelphia Interior Storage Depot, Philadelphia, Pa.
Constructing engineer and late manager of building for the Great Northern Railway at St. Paul, Minn. Previous experience general railroad construction.
- Lieut. Col. J. N. Pease, at headquarters.
Mill engineer for Lockwood, Green & Co., engineers, Boston, Mass.; prior to this time was in business for himself.
- Lieut. Col. Warren R. Roberts, at headquarters.
President and principal owner, Roberts & Schaefer Co., Chicago, Ill. Manufacturers and contractors of coal-handling and coal-washing apparatus.

- Lieut. Col. D. H. Sawyer, constructing officer, Air Nitrate Plant, Cincinnati, Ohio.
Partner of Sawyer Bros., Spokane and Seattle, Wash., consulting engineers on railroad construction, hydraulic work, irrigation, drainage, and roads.
- Lieut. Col. E. C. Stockdale, at headquarters.
With Page & Hill Co., Minneapolis, Minn., formerly on construction projects, including St. Croix Falls, Wis., Hydroelectric Development, Keokuk, Iowa, and Rause Lake, Mont., development.
- Lieut. Col. George B. Walbridge, at headquarters.
President Walbridge, Aldinger & Co., general contractors, of Detroit, Mich., for about eight years; prior to that had much experience with George A. Fuller Co.
- Lieut. Col. F. B. Wheaton, at headquarters.
For many years connected with office of Supervising Architect of the Treasury.
- Lieut. Col. R. M. White, at headquarters.
Division superintendent of Lackawanna Railroad with previous experience in engineering construction and railroad operation.
- Lieut. Col. C. C. Wright, at headquarters.
Partner of Geo. C. Nimmons & Co., Chicago, Ill., architects and engineers, specializing on warehouse and industrial construction and all construction work for Sears, Roebuck & Co.
- Lieut. Col. L. L. Calvert, at headquarters.
Chief engineer for 12 years for the Tidewater Building Co., general contractors, New York City.
- Lieut. Col. H. S. Crocker, constructing officer, South Brooklyn Port and Terminal, N. Y.
In business for himself as engineer and contractor in Colorado and formerly erecting manager of the American Bridge Co.
- Lieut. Col. E. H. Abadie, at headquarters.
Engineer and contractor at St. Louis, Mo., engaged in the construction of street railways and public utility plants.
- Lieut. Col. R. F. Proctor, constructing officer, Curtis Bay Ordnance Depot, Md.
Chief engineer of the American Casualty Co., completing work on which contractors had failed. Prior to this had several years experience with contractors.
- Lieut. Col. G. B. Strickler, constructing officer, Camp Hancock, Augusta, Ga.
Engineer and contractor in business for himself at Washington, D. C., and Baltimore, Md.

CIVILIAN PERSONNEL.

CIVIL SERVICE.

Civilian employees are subject to the rules and regulations of the Civil Service Commission as to qualifications and to the Appointment Division of the War Department as to salary.

The securing of civilian personnel by the Construction Division seems to have been a trying and difficult problem during the entire war period. At the commencement of the war the eligible lists of the Civil Service Commission were inadequate in numbers, schedules of classifications and grades to meet the requirements. The statutes under which the Civil Service Commission acts grant it authority to make or suspend rules to cover or meet almost any contingency. This provided flexibility, when properly exercised, but did not

provide personnel. Whether, in time of emergency, it is or is not detrimental to the activities of a military bureau, seems to depend entirely on the commission's policy and not on the civil service law, which gives it large discretionary powers.

It is the belief among those of the Construction Division who were interviewed on the subject that the Civil Service Commission failed to appreciate fully the great difficulties facing the division. They state that the methods prescribed by the commission for filling positions proved inadequate under war conditions when, during the period of the most rapid growth of the division, it was necessary to fill positions promptly; that the demand for properly qualified assistants, including technical experts, accountants, clerks, and stenographers, was continuous and pressing; that the filling of these positions by civil service procedure requires the submission of specifications to the Civil Service Commission, the return of an eligible list, the selection of candidates therefrom, and correspondence with them to ascertain whether they are available and are willing to accept the position on the terms offered; that though the candidates on such eligible lists may be thousands of miles distant from the location of the position to be filled, the rules of the commission require that they be considered if they head the list; and that the inadequacy of this procedure to meet war conditions and its effect upon speed are obvious. The commission is stated to have realized this later and allowed the division to fill positions with temporary employees, of whom many were afterward passed and certified by the commission.

As early as October 9, 1917, the officer in charge of cantonment construction, in a letter to the Secretary of War on the subject of emergency construction, stated that "experience gained in the construction of the cantonments indicates that the following specific authorities be given and approved by you:

"(4) Authority to employ the service of such personnel as may be needed without reference to the civil service list."

APPOINTMENT DIVISION, WAR DEPARTMENT.

Those interviewed stated that securing the approvals of the Appointment Division of the War Department was unduly difficult and time consuming. As mentioned elsewhere, the high wages paid skilled and common labor caused much difficulty in securing and holding auditors, timekeepers, and clerical forces in the field. The salaries allowed by the Appointment Division of the War Department for these positions were stated to have been often insufficient and unduly low in proportion to the wages paid workmen, to the increasing cost of living, and to the character of the service which the work demanded.

It was also stated that the rulings of the Appointment Division made promotions unduly slow and difficult; that, if a man showed ability and was promoted to a position of greater responsibility, he was seldom granted the salary due to that promotion or equal to the salary of the former incumbent or to that which would be paid a new man; and that these conditions caused dissatisfaction and the loss of many men whose services were valuable and badly needed.

The authorized and actual numbers of civilian employees of the Construction Division at Washington and their classifications and salaries, on November 11, 1918, were as follows:

Position.	Authorized number.	Actual number.	Yearly salary.
Accountants.....	193	91	\$2, 100-\$4, 000
Technical, including architects, auditors, draftsmen, engineers, estimators, expeditors, inspectors, principal clerks, purchasers, timekeepers, town planners, voucher clerks.....	974	834	1, 800- 4, 000
Clerks.....	1, 480	320	1, 100- 1, 800
Minor clerks.....		79	480
Stenographers.....		294	1, 100- 1, 500
Typists.....		546	1, 000- 1, 200
Machine operators.....		25	1, 100- 1, 200
Blue printers.....	25	2	720- 1, 000
Messengers.....	200	133	480- 840
Laborers, charwomen, etc.....	90	45	480- 720
Chauffeurs.....	16	2	840
Total.....	2, 978	2, 353	.....

In the field were about 10,000 civilian employees who received salaries similar to those paid the Washington employees. These were classified as follows: Engineers, assistant engineers, rodmen, instrument men, draftsmen, auditors, accountants, material inspectors, time inspectors, timekeepers, clerks, bookkeepers, stenographers, typists.

Recapitulation of personnel, Nov. 11, 1918.

Commissioned officers:

In Washington..... 415
In field..... 1, 014

Enlisted men, in field..... 12, 965

Civilian employees:

In Washington..... 2, 353
In field..... 10, 000

Total..... 26, 747

PROMOTIONS.

Military promotions in time of peace are made under the act of October 1, 1890, section 1 of which provides that—

Hereafter promotions to every grade in the Army below the rank of brigadier general throughout each arm, corps, or department * * * shall be made according to seniority in the next lower grade of that arm, corps, or department.

Section 3 of the same act provides that professional examination to determine the fitness of such promotions be prescribed by the President. If an officer fails in a professional examination, his right to promotion is suspended for one year, when he is eligible for reexamination. In the event of a second failure he is discharged from the service. In case of failure to pass the required physical examination, the officer is placed on the retired list with the rank to which he would have been promoted had he been found qualified. (Military Laws of the United States, 1915, 5th ed., pars. 927-933 inclusive.)

Promotions in war time are made by the chief of each arm, corps, or department, upon the recommendation of the officer in charge of each branch or division of such arm.

Increase of salary of civilian personnel is made by recommendation to the Appointment Division of the office of the Secretary of War. If, however, promotion includes a change to another classification, the applicant must pass the examination of the Civil Service Commission for that classification.

COMMENTS AND CONCLUSIONS.

Based on the statements and criticisms above referred to which were made or confirmed by headquarters officers, constructing quartermasters, field auditors and contractors, the disadvantages far outweigh the advantages of civil service regulation on construction work done under war conditions. This would naturally follow from the fact that civil service is defined as the executive branch of the public service as distinguished from military, naval, legislative, and judicial.

The Board of Review is of the opinion that, in an emergency, the bureau charged with construction should be freed entirely from civil service requirements and authority, if its chief so recommends, and that its method of advancement and salary list should be revised by the War Department to provide for the prompt payment of adequate salaries and for reasonably rapid advancement when recommended by the chief of a bureau.

Relief might be found for some of these difficulties by the establishment of additional listed grades in the Army, open to both men and women, on the same basis as like positions now held by civilian employees.

The board believes that war experience has shown that construction work in time of war should not be subordinate to any military or civil authority of less authority than a Cabinet officer.

SECTION 23.

CONSTRUCTION DIVISION AS LATER CONSTITUTED.

The Board of Review obtained much of the information herein given as to the duties and procedure of the divisions of the Construction Division by calling the division chiefs before it, examining them, receiving their oral statements of facts and opinions, and discussing all details. It also requested and received a supplementary written statement from the chief of each division. The annexed Exhibit No. 9 is a general organization chart of the Construction Division of the Army.

ORGANIZATION.

The organization is an outgrowth of the previous organizations with duties and methods dictated largely by experience. It operates under Office Order No. 99, issued September 3, 1918, with but slight modifications. This order provides for seven divisions or branches of the Construction Division, as follows:

- (a) Building division (formerly the constructing branch).
- (b) Engineering division.
- (c) Contracts division.
- (d) Procurement division.
- (e) Administrative division.
- (f) Accounting division.
- (g) Maintenance and repair division.

The authority, duties, office procedure and organization of these divisions, and their personnel as of November 11, 1918, are as follows:

AUTHORITY.

OCTOBER 5, 1917.

From: The Adjutant General of the Army.
 To: The Quartermaster General of the Army.
 Subject: Emergency construction.

1. The Secretary of War directs that all building and construction rendered necessary in the United States by the present emergency and provided for by existing or pending appropriations shall be executed by the Quartermaster General's Department under the direction of Col. Littell.

2. If any special case seems to any head of a department an exception to this rule, the Secretary of War will pass on it separately.

By order of the Secretary of War:

JOHN S. JOHNSON, *Adjutant General*.

FEBRUARY 19, 1918.

From: The Adjutant General of the Army.
 To: The Quartermaster General of the Army.
 Subject: Cantonment Division.

* * * The Construction Division will hereby constitute a part of the office of the Chief of Staff in connection with section 3, paragraph 5, General Order No. 14, February 9, 1918, War Department, now in process of issue.

By order of the Secretary of War:

GEORGE L. HICKS, Jr., *Adjutant General*.

MARCH 13, 1918.

From: The Adjutant General of the Army.
To: Officer in charge of cantonment construction.
Subject: Cantonment Division.

Under authority granted in section 1 of the act of Congress * * * approved May 18, 1917, the President directs that the Cantonment Division of the Quartermaster Corps (including as a part thereof construction and repair division of the Quartermaster Corps), now operating as a part of the office of the Chief of Staff, shall hereafter be called the Construction Division and shall be temporarily increased during the present emergency so as to consist of, including commissioned personnel of Quartermaster Corps, Regular Army, National Guard, National Army, and Reserve Corps heretofore authorized, and including officers of other arms, staff, corps, and departments who may be detailed for duty with the Construction Division other than liaison duty.

By order of the Secretary of War:

J. B. WILSON, *Adjutant General.*

APRIL 10, 1918.

From: The Adjutant General of the Army.
To: Officer in charge of Construction Division.
Subject: Plans, specifications and estimates for construction work and engineering services and services of contractor.

1. You are informed that all plans, specifications and estimates for construction work to be prepared by or under the supervision of the Construction Division upon general requirements given in advance by the bureau involved, all engineering services and services of contractors in connection herewith will be done by the Construction Division.

2. The Construction Division will see to it that the designs will fulfill in an efficient manner the general requirements laid down and will be solely responsible for the execution of the construction work. * * *

By order of the Secretary of War:

ROY A. HILL,
Adjutant General and the Director of Storage and Traffic.

Supply Circular No. 90, issued September 10, 1918, by the Purchase, Storage and Traffic Division, General Staff, paragraph 6, reads as follows:

The Construction Division shall prepare and at all times maintain as a live and up-to-date record an approved construction program, which shall be divided into two classes:

(a) Construction projects undertaken by the Construction Division as prescribed herein (whether class I, the sole or primary purpose of the contract, and to be consummated by the War Department under its immediate supervision and for direct Government needs, or class II, incidental to the primary purpose of a contract for the furnishing of supplies or the doing of a service, the construction work paid for directly out of Government funds).

(b) Construction projects incidental to other contracts and not undertaken by the Construction Division but undertaken by a contractor of one of the bureaus as prescribed herein. * * *

By authority of the Secretary of War:

GEO. W. GOETHALS,
*Major General, Assistant Chief of Staff,
Director of Purchase, Storage and Traffic.*

SECTION 24.

EXECUTIVE OFFICE OF CHIEF OF CONSTRUCTION DIVISION.

DUTIES.

The duties of the executive office of the Chief of the Construction Division are, in general, to pass upon and decide broad questions of policy, to issue instructions for the general conduct of the organization and to coordinate and direct matters which may be of interest to more than one division of the Construction Division.

All communications prepared for higher authority in the War Department, as well as letters or memoranda for other branches of the Government, are viséd in this office and signed by the Chief of the Construction Division before transmission.

Daily conferences are held by the Chief of the Construction Division with the division heads at which questions of policy and procedure are discussed and methods of handling determined, and information of mutual interest and value is exchanged by the division heads.

PERSONNEL.

Chief of the Construction Division: Brig. Gen. R. C. Marshall, jr.

Assistant: Maj. Wm. G. Maupin.

SECTION 25.

BUILDING DIVISION.

DUTIES.

Obtains requirements, authorizations, and funds for projects, directs the constructing forces of the division in the field and advises and directs the commercial relation of the Construction Division as follows:

(a) Prepares preliminary information and estimates of cost of construction for the approval of the Secretary of War, based upon fundamental engineering principles, standards, and requirements laid down under the head of engineering.

(b) Conducts the procedure of authorizations and allots funds for construction work.

(c) Passes upon the recommendations for general contractors made by the committee on emergency construction of the War Industries Board.

(d) Supervises the execution of the work in accordance with the general plans, fundamental principles, and standards set down under the head of engineering, and supplements those where necessary with such additional details as may be needed for the proper execution of the work.

(e) After execution of contract directs and supervises all relations with each general contractor carrying out a construction project.

(f) Maintains progress records and statistical data, including man-hour production and unit prices on construction work.

(g) Conducts through supervising constructing quartermasters all correspondence, except the allotment of funds from the division in Washington to the field forces.

(h) Is responsible for seeing that service contracts such as water, electricity, and the like are executed, ready for the commencement of permanent operation and use by the necessary utilities for the various projects, and that the knowledge of the constructing quartermaster, engineering, and maintenance and repair are utilized in this connection.

(i) Advises with the constructing quartermaster on each project in such duties as:

(1) The selection and approval of supervising engineers and the approval of sub-contractors.

(2) The supervising of employment by the general contractors.

(3) The purchase of materials by the general contractor, either by mobilization through the Washington office or direct from local stock on hand at the site as may be determined to be in the interest of the Government.

(4) The maintenance of a proper system of accounting and the disbursement of funds in accordance with general standards and policies laid down under the head of accounting.

(5) The protection, including guards, of all Government property, against fire, theft, and all other dangers.

OFFICE PROCEDURE.

The building division, formerly called the constructing branch, is divided into eight sections, of which six sections designated by letters from "A" to "F" handle directly the construction work; the two other sections are the requirements section and the Government equipment and material section.

CONSTRUCTION SECTIONS A TO F.

Each section has charge of a particular kind of construction, as follows:

Section A, in charge of southern camps and quartermaster shops.

Section B, in charge of northern camps and general hospitals.

Section C, in charge of storage and terminals.

Section D, in charge of Ordnance depots.

Section E, in charge of Signal Corps and unclassified.

Section F, in charge of Regular Army and Coast Artillery posts.

Each construction section has a number of supervising constructing quartermasters stationed in Washington who report to the section chief. Each of these supervising constructing quartermasters has charge of a number of projects and represents the constructing quartermasters of these projects at the Washington office, and all correspondence relating thereto passes over his desk. Each section secures preliminary information, makes estimates of the cost, and prepares requests to be sent to the Secretary of War for approval and authorization of funds for projects under its jurisdiction.

The section chief passes upon recommendations for general contractors and, after the execution of contracts, directs and supervises each general contractor on projects under his section. He approves all subcontracts, including civil contracts with public utilities for water, electric light, etc., and sees that they are executed and ready

for operation by the utilities branch, after he has consulted with the engineering and maintenance and repair divisions and the constructing quartermaster of the project. In conjunction with the supervising constructing quartermasters and the constructing quartermasters, he supervises all employment by the general contractors and the purchase of material by the general contractors, whether by mobilization through the Washington office or direct from stock near the sites, as conferences with the engineering and procurement divisions may determine are for the best interests of the Government. He supervises the maintenance of proper clerical forces for accounting and disbursement of funds in accordance with the methods, policies, and procedure dictated by the chief of the accounting division. He also supervises the proper guarding of Government property against fire, theft, and other damage.

This change of organization did not affect the supervising constructing quartermasters, as they were continued in charge of the same projects. The aim of this reorganization was to effect a greater cooperation and expedition in obtaining information essential to construction projects.

In order at all times to make the field construction as independent and direct as possible, four advisory heads were established under each section head, as follows:

(a) Section engineers' unit will deal with engineering and estimating problems that are peculiar to the section in which they function and take care of all engineering details not of sufficient moment to require review by the engineering division. The duties of the section engineer, in part, are as follows: Advisor to the supervising constructing quartermaster on all matters of engineering; approves all contracts for engineering services; supervision of the preparation of all estimates in general; to coordinate all engineering work done with the section.

(b) Estimates and cost unit will supervise the keeping of costs, the execution of properly established policies and standards for accounting and estimating. Supervise all costs and review all estimates in the field and prepare all other estimates and applications for authorizations except where they are of such size or character that they should be prepared by the engineering division.

(c) Material unit will assist the section head and the supervising constructing quartermasters on procurement of materials and will coordinate the work of the section with that of the material division. Its duties are to survey the materials requirements; to expedite delivery of purchase authorizations in proper form to the procurement division; to keep in touch with progress of material movements to each job and with job emergency requirements and purchases from local stock.

(d) Administrative unit. In this unit will be placed the necessary office force and general routine of the section head's work. The duties of the administrative officer will be to maintain records showing all officers and their constructing and engineering experience; to supervise and organize the general office force of the section.

REQUIREMENTS SECTION.

In the reorganization the requirements section, which had been in the engineering division, was placed in the building division and the personnel and records of that section were moved to the building

division. Col. Gunby assumed these duties in the building division as well as his regular duties as chief of the engineering division.

The duties of the requirements section are the obtaining of requirements, authorizations and funds for projects, obligation of funds, and liaison with the director of operations for the approval of projects. It is the duty of the requirements section to issue a formal notice to all concerned authorizing construction work, or in case a request is refused, to notify the proper section chief.

The requirements section is also charged with the allotment of funds to the various projects which are based on the estimates for the cost of the work and the approval of proper authority for the expenditures. The accounting division makes the actual allotments to the project only on the basis of the authorization received from the requirements section.

This change of responsibility and authority eliminated many difficulties and has been conducive of very much better working relations between the divisions.

The principal duty of the requirements section—the authorization and the procurement of funds for projects—is dealt with later.

OFFICE ORGANIZATION.

The organization of the requirements section consists of three branches—the authorizations and allotments branch, the liaison branch, and the record room. The authorizations and allotments branch has two departments, namely, authorizations, and funds and allotments.

All outgoing estimates, allotments, and authorizations pass through the requirements section for record, but all communications addressed to higher authority or to other active departments are to be prepared by the requirements section, except that letters relating to technical matters be prepared by the expediting officer.

When the Construction Division is requested by any division of the War Department to proceed with a project, the requirements section will proceed to secure necessary funds and allotments therefor. The requirements section will, when necessary, call on the advisory engineers or architects, or both, for recommendations, and will call on the proper expediting officer to assemble such data and estimates as may be needed in preparing the case for presentation to higher authority.

GOVERNMENT EQUIPMENT AND MATERIALS SECTION.

This section was started in November, 1917, when it was decided that the Construction Division (then the Cantonment Division) would undertake other projects than the 32 original cantonments and camps. Demands for construction equipment, materials, tools, etc., were then being received from new projects, and excess stocks from the original camps were shipped to fill their needs. For many weeks these matters were handled entirely by telegraph and all constructing quartermasters were directed to prepare tentative inventories of material and equipment that could be released.

A clause of the standard Contract for Emergency Work provides that the contractor's equipment shall be rented at an agreed valuation and rental rates. When the agreed rental equals the valuation the equipment becomes the property of the Government. It also provides that at any time during the rental period the constructing quartermaster may take title to the equipment by paying the difference between the rental paid and the valuation. It became necessary, as construction work on any project neared completion, to determine whether this option should be exercised on any of the equipment on a project. Such decisions were one of the duties of the Government equipment and materials section.

The amount of equipment acquired in this manner was small and does not seem to be in excess of what will be needed for the normal use of the Army. The exercising of the option of purchase rights was not used for confiscation, nor was equipment often taken over for its salvage value when largely paid for in rental fees. If there was a demand for equipment on which decision was asked, it was taken over, provided the percentage saved in rental and the demand elsewhere justified such action.

In the spring of 1918 it became possible to divert Army motor transportation to the use of this division. This resulted in a great reduction in hired vehicles. About 1,000 motor trucks, largely of 3-ton capacity, and 1,200 passengers cars were obtained for construction work. Securing these machines was one of the duties of this section. The provisions of General Order No. 75, creating the Motor Transport Corps, made it necessary to prepare instructions for the constructing quartermasters describing the methods of procurement, transfer and maintenance of trucks and cars. This order apparently handicapped the control of transportation problems at the projects by constructing quartermasters at a critical time in the construction program.

The provisions of General Order No. 75, which required the transfer to the Motor Transport Corps of all Government-owned motor equipment and placed its distribution and operation in charge of an officer of that corps, embarrassed the constructing quartermasters, as it removed their control.

With the creation of the six sections in the building division in September 1918, it became necessary to designate an officer in each section who should "maintain a suitable record of Government material and equipment in accordance with general policies authorized by the specialists on equipment." In Order No. 99, these duties were placed in charge of the administrative officer. These six officers, therefore, reported to the administrative officer and acted within each section as the material and equipment unit had acted previously for the whole division. The equipment and material section

continued to handle the correspondence with the Motor Transport Corps and with other bureaus of the War Department from which it was possible to secure equipment for construction work, including wagons, harness, remount animals, cots, tentage, fodder, etc. This unit continued to act until December 17, 1918, when Office Memorandum No. 48 created the material and equipment disposal unit as a part of the procurement division. The Government equipment and material section was combined with two sections of the procurement division to form this new unit.

The duties of the Government equipment and material section are as follows:

- (a) Supervises the activities of the equipment officer in each building section.
- (b) Acts as a clearing agency for the transfer of equipment from one project to another.
- (c) Advises and secures rulings with respect to rentals of equipment.
- (d) Prepares for the distribution necessary bulletins outlining the policies of the officer in charge of building division respecting equipment.
- (e) Handles all correspondence with the Motor Transport Corps relating to procurement, transfer, and maintenance of motor transportation equipment.
- (f) Secures for use on construction jobs, from other bureaus of the War Department, such available equipment as horses, wagons, harness, forage, cots, ranges, mess tables, etc.
- (g) Keeps generally familiar with the equipment rental market, and maintains record of all equipment tendered for rental or sale.
- (h) Handles matters pertaining to the surplus inactive supplies service of the General Staff.

Contact with the field officers is through the supervising constructing quartermasters and the administrative officers of the six building sections who are responsible for all equipment within their sections.

It is the purpose of this section to aid the constructing quartermasters in procuring equipment, whether United States property, or by rental; and in disposing of it advantageously when no longer needed on a project.

PERSONNEL.

Officer in charge, Col. M. J. Whitson.

Associate officer in charge, Col. P. Junkersfeld.

Associate officer in charge of requirement section, Col. F. M. Gunby.

SECTION A—SOUTHERN CAMPS AND QUARTERMASTER SHOPS.

Section chief, Lieut. Col. O. P. Chamberlain.

Section engineer, Maj. C. E. Smith.

Administration officer, Capt. R. W. Beal.

Materials expediter, Capt. C. F. Wiley.

Estimates and costs, Mr. J. Weare.

Supervising constructing quartermasters:

• Maj. J. G. Stevenson, assisted by Lieut. M. H. Herzog.

Maj. T. F. Laist, assisted by Capt. W. S. Bessell.

Maj. E. J. Cook, assisted by Capt. C. S. McAllister.

Maj. D. B. Kimball.

Lieut. Col. E. H. Abadie, assisted by Capt. A. L. Cunningham.

SECTION B—NORTHERN CAMPS AND GENERAL HOSPITAL.

Section chief, Lieut. Col. C. C. Wright.

Assistant section chief, Maj. G. R. Solomon,

Section engineer, Capt. E. B. Black.

Administrative officer, Maj. K. C. Grant.

Materials expediter, Maj. R. C. Canterbury.

Estimates and costs, J. J. Crotty.

Supervising constructing quartermasters:

Maj. W. D. Foy, assisted by Capt. H. L. Glazier.

Maj. F. T. Seabury, assisted by Capt. H. F. Hentz and Capt. A. T. Brown.

Maj. L. H. Lewis, assisted by Maj. J. A. Nyden.

SECTION C—STORAGE AND TERMINALS.

Section chief, Lieut. Col. R. M. White.

Section engineer, Capt. G. W. Carr.

Administrative officer, Capt. A. D. Chidsey, jr.

Materials expediter, Capt. W. H. Hale.

Estimates and costs, J. J. Donohue.

Supervising constructing quartermasters:

Maj. W. L. Maloney.

Lieut. Col. L. L. Calvert.

Maj. C. H. Fisk, assisted by Capt. T. E. Jewett.

SECTION D—ORDNANCE DEPOTS, MANUFACTURING AND PROVING PLANTS.

Section chief, Lieut. Col. G. F. D. Trask.

Assistant section chief, Maj. A. C. Everham.

Section engineer, Maj. J. S. Henderson.

Administrative officer, Capt. R. W. Alger.

Materials expediter, Capt. H. C. Bissell.

Estimates and costs, Maj. H. S. Glazier.

Supervising constructing quartermasters:

Maj. M. R. Mavor, assisted by Capt. W. S. Newhall.

Maj. H. U. Wallace, assisted by Capt. H. D. Shaw.

Maj. W. P. Pritchett, assisted by Capt. C. B. Spencer.

Maj. E. F. Bracken, assisted by Capt. H. J. Lumsden.

Capt. L. D. Goddard, assisted by Capt. D. M. Hoyt.

Capt. I. J. Hooks, Maj. H. D. Rawson, assisted by Capt. P. T. Barrett.

SECTION E—SIGNAL CORPS, AERONAUTICS, HOUSING AND UNCLASSIFIED.

Section chief, Lieut. Col. G. B. Walbridge.

Assistant section chief, Maj. G. W. Carlton.

Section engineer, Capt. W. H. Adams.

Administrative officer, Lieut. H. B. Andrews.

Materials expediter, R. H. Gordon.

Estimates and costs, Capt. T. J. Moore.

Supervising constructing quartermasters:

Capt. T. P. Foley, assisted by Capt. W. W. Catlin.

Maj. P. V. Hyland, Mr. R. H. Gordon, Maj. J. R. Werth, assisted by Capt. F. S. Hird.

Capt. Wm. A. Bennett, Capt. R. C. Dunbar, assisted by Lieut. W. W. Gray.

SECTION F—REGULAR ARMY AND COAST ARTILLERY POSTS, EXCLUSIVE OF LARGE HOSPITALS.

Section chief, Maj. H. W. Lockett.
Assistant section chief, Maj. J. B. Coleman.
Section engineer, Capt. A. H. Mallery.
Administrative officer, Capt. J. E. Clifford.
Materials expediter, Capt. F. L. DeArmond.
Estimates and costs, Lieut. T. S. Rogers.
Supervising constructing quartermasters:

Maj. W. H. Conklin, assisted by Capt. H. B. Ested, Lieut. H. Fish.

The following liaison officers and special representatives of bureaus and departments of the Government for which construction work was being conducted acted with these sections:

Ordnance Department, Lieut. Col. B. B. Lathbury.
Military Aeronautics, Capt. R. C. Dunbar.
Motor Transport Corps, C. R. McNiece, assisted by Capt. C. H. Kain.
Medical Corps, Capt. H. C. Cutler, Lieut. C. H. Woodbridge.
Purchase, Storage and Traffic, Capt. W. J. Nicoll.
Tank Corps, Capt. D. E. Hannan.

Lieut. Col. Geo. B. Walbridge acted as liaison officer between the Construction Division and the General Staff.

In connection with materials for housing, the United States Shipping Board kept a representative, Mr. James Albro, with the procurement division.

Maj. James E. Schuyler represented in a similar way the United States Housing Corporation.

REQUIREMENTS SECTION.

Officer in charge, Maj. H. S. French.
Assistant, Maj. A. J. Widmer.
Assistant, Maj. C. H. Prindiville.
Estimates, Capt. E. R. Nichols.
Ordnance work, Capt. F. S. Marlow.
Signal Corps work, Capt. R. C. Dunbar.
Funds, Capt. G. F. Thurber.
National Army, Regular Army, and Coast Artillery posts, National Guard camps, miscellaneous cantonments, warehouses, terminals, and ports of embarkation, Lieut. T. S. Rogers.
Hospitals, Mr. W. A. Strong.
Authorizations and advance information, Capt. T. W. Nicolet.
Principal clerk, Mr. R. S. Jennings.

GOVERNMENT EQUIPMENT AND MATERIALS SECTION.

Officer in charge, Maj. E. T. King.
Assistant, Capt. C. A. Schwaneflugel.
Section A, administrative officer, assisted by Lieut. Elmer Leigh Walker.
Section B, Capt. Harrison Stidham.
Section C, administrative officer, assisted by Mr. Edward Fowler.
Section D, Capt. A. C. Aslesen.
Section E, administrative officer.
Section F, administrative officer.

AUTHORIZATION OF PROJECTS.

Prior to the reorganization of September 3, 1918, the authorization of projects and the procurement of funds and allotments was carried on in the engineering division by a requirements section. Under the new plan, this section, with its personnel and files, was transferred to the building division. The methods and procedure were as follows:

The approval of all projects by the Secretary of War, through the Director of Operations, was required, excepting those costing \$5,000 or less, which were approved by the Chief of the Construction Division. All necessary data, estimates, etc., on new or additional construction work, desired by any division of the War Department, or estimates and other information requested by the Director of Operations which related to proposed or old construction work, were collected by the section in whose jurisdiction the project belonged; and request for authority to the Director of Operations or the Chief of the Construction Division was sent to the requirements branch of the building division.

It was the duty of the War Industries Board to approve projects for which the material was not more urgently needed elsewhere and to see that projects were not located in areas congested with war activities. This approval was called clearance.

Clearance was required on all new projects involving expenditures over \$25,000, and on extension of projects under construction when the cost of the work contemplated exceeded 25 per cent of the original project (previously approved by the War Industries Board) or was more than \$100,000. A request for clearance of the project was prepared by the section concerned and sent through the liaison officer to the War Industries Board. After clearance the request was forwarded by the liaison officer of the requirements branch to the Director of Operations, who forwarded same to the Secretary of War for approval of the project and expenditure of funds. After action thereon, the papers were returned through The Adjutant General's Office to the requirements branch by special messenger, which then issued the formal notices of approval or disapproval to the proper section. If approved, an order to proceed with the construction work was issued, and the accounting division authorized to secure for the project the allotment of funds from the Director of Finance. The section chief was required to keep the originating bureau properly informed as to the status of its request.

The Chief of the Construction Division then sent a request to select a contractor to the committee on emergency construction of the War Industries Board. To this selection the approval of the Secretary of War was also required. The section chief, with the approval of

the chief of the building division, then selected a constructing quartermaster.

The accounting division notified the Director of Finance of the Division of Purchase, Storage and Traffic, who notified the United States Treasury, which placed the funds to the credit of the constructing quartermaster of the project, who then could draw directly upon the United States Treasury.

The clearance of projects by the War Industries Board was dealt with through a subagency, known as the new facilities division. This body was composed of 11 members, as follows:

War Industries Board, 1 member, acting as chairman.

War Department, 2 members (1 member from the Construction Division; 1 member from the Purchase, Storage, and Traffic Division).

Navy Department, 2 members.

Shipping Board, 1 member.

United States Housing Corporation, 1 member.

United States Railroad Administration, 1 member.

Department of Labor, 1 member.

Requests for clearance of projects were made to the new facilities division which, after review, made recommendations to the War Industries Board, which passed finally on the clearance of the project. A request for clearance was usually made from data based on preliminary plans and estimates of material and labor. This method avoided undue loss of time in the working up of projects which might fail of approval. In the preparation of plans and specifications the section chief was in touch, through his procurement officer, with the procurement division, and was governed thereby in the selection of materials. The procurement division, being one of the agencies of the War Industries Board and the agency for the procurement of building materials, was informed at all times as to the availability of building materials.

PROCUREMENT OF FUNDS.

The United States Treasury is the depository for all funds of the Government and funds for War Department construction work are appropriated by Congress.

The Construction Division made estimates of the requirements of funds for war construction work for the Quartermaster's Department for the fiscal year beginning July 1. Under the plan made effective September 3, 1918, this was handled through the building division of the Construction Division. These estimates were transmitted to the Quartermaster General (now the Director of Finance) and are included in his total yearly estimate submitted by him to the Chief of Staff for transmission to the Secretary of War. Such estimates are transmitted from the Secretary of War to the Secretary of the Treas-

ury and from the Secretary of the Treasury to Congress as a basis for the appropriation of funds. The proper committee of Congress, either the Appropriation Committee or the Military Affairs Committee may call upon the Construction Division to explain and justify its estimates.

Funds for construction for the housing and accommodation of troops are included in the appropriation for the Quartermaster Corps of the Army. All other construction funds are included in the appropriation for the bureau utilizing it. Funds for construction work for the Quartermaster Corps were apportioned directly to the Construction Division. Funds for construction work on projects for other bureaus or corps of the Army were transferred from the funds of that bureau or corps to the Construction Division to the estimate amount required for each project. All War Department construction work in the United States must be done by the Construction Division unless otherwise authorized by the Secretary of War.

EXPENDITURE OF FUNDS.

Funds can not be expended for construction work without approval of the Secretary of War except in the case of projects requiring less than \$5,000, in which case the Chief of the Construction Division may authorize the expenditure.

After the Secretary of War approves a project and authorizes the expenditure of funds therefor, the requirements branch of the building division issues the proper order to proceed with the work and authorizes the accounting branch to allot the funds for the project. The accounting branch notifies the Director of Finance, who allots the funds. The disbursing officer then requisitions the funds from the Director of Finance, who notifies the United States Treasury to honor the disbursing officer's checks to the amount of the requisition. Under this system the Construction Division has only a memorandum record, received from the project, of the state of funds on any project.

After the constructing quartermaster has completed a project he turns it over to an officer authorized to receive it, accounts for funds to the Director of Finance and for property to the property accounting branch of the Director of Finance and returns any surplus funds to the United States Treasury.

ACCOUNTABILITY OF FUNDS.

This subject would be properly dealt with under the accounting division of the Construction Division if the latter had been given authority over and made responsible for the accounting of funds. As this was not done it seems desirable to insert it here because of its relation to the matters immediately preceding.

The foregoing statement shows that, while the Construction Division makes the estimates of construction expenditures for the approval of the Secretary of War and, in the case of work for the quartermaster General's office, makes and explains the estimates on which congressional appropriations are based and is responsible to the Quartermaster's Department or other bureau or corps for the completion of the work, it lacks control over funds and accounting.

The disbursing officer, usually the constructing quartermaster, deals directly with the Director of Finance and the Treasury of the United States and is subject to a Treasury audit only. The accounting division of the Construction Division employs the accountants and clerks, lays down rules, and gives advice for their guidance, but it has neither authority nor responsibility for such accounting, as the disbursing and property officers report to the Director of Finance independently of the Construction Division, which can not be sure, therefore, that an administrative audit of the accounts is made before they are sent to the United States Treasury for final audit and settlement. After a disbursing officer has been suspended for irregularities in his accounts, which are usually technical, the accounting division undertakes the reaudit of the accounts in an effort to secure the release of the disbursing officer.

The law (A. R. 655, 1913) governing Army accounts requires that:

The chief of a bureau to which accounts pertain will cause each account current, with its accompanying papers, to be examined and transmitted to the Treasury Department, with his decision indorsed thereon, within 60 days from the date on which such account was received at his office. He will bring to the notice of the Secretary of War all matters of account that require or merit it. When a suspension or disallowance is made, the bureau will notify the officer that he may have an opportunity to submit explanations or take an appeal to the Secretary of War.

Although this law requires that a preliminary or administrative audit be made by the chief of the bureau to which the disbursing officer is attached, and the disbursing officer on construction is attached to the Construction Division, the audit, if any, is made by the office of the Director of Finance in the Division of Purchase, Storage, and Traffic, which is an entirely separate bureau. The practice of the office of the Director of Finance has been to send accounts to the Treasury Department without preliminary audit. The audits which are being made by the Construction Division, after suspensions by the Treasury Department, are made voluntarily, with the approval of the Director of Finance.

The Board of Review is of the opinion that the department which is responsible for the design and construction of projects should have complete responsibility and accountability for funds and property for the same. The experience of the Construction Division shows it to be impractical and uneconomical to separate accounting from other features of construction.

COMMENTS AND CONCLUSIONS.

In the last organization a supervising constructing quartermaster was placed in charge of a number of projects of generally similar character and reported to the section chief having charge of that group of projects. The organization could be readily expanded by the addition of supervising constructing quartermasters, or of entire sections. Advisory engineers were always available to assist section chiefs with engineering and construction advice.

This plan worked well. Its great advantage was that it avoided overloading individual chiefs or other principals and made certain that each had proper knowledge of the essentials of his project or projects. This enabled the section chief to make prompt decisions and to give the instructions required by his subordinates or by contractors.

The field force was kept informed by the supervising constructing quartermaster through the constructing quartermasters of the standards and policies determined by the executives, by the staff of advisory engineers, and by their respective section in Washington.

The Washington office was also kept in touch, through the same channels, with the condition and progress of each project.

Summarizing: The plan embodied in the building division reorganization was to pyramid a group of projects under a supervising constructing quartermaster, and a group of supervising constructing quartermasters under a section chief vested with all necessary authority to assist the constructing quartermaster and contractor in securing promptly necessary advice, data, or information. Had the war continued and the amount of Army construction increased, additional sections would have been established to handle the additional work.

The board knows of no better organization plan for the successful handling of a large number of war or peace construction projects in many locations and of diversified character. Under the plan, rulings were made in a proper and orderly manner by the section chiefs and their subordinates, i. e., by those responsible for and in relatively close touch with the projects.

A regional administration for construction work was carefully considered but rejected because of the delays which would result from passing matters through regional offices and the difficulty of keeping these offices in close touch with headquarters' policy and of giving them the benefit of headquarters' experience.

Under war conditions a saving of time is vital. Any plan to be successful must avoid delays. These are most frequently due to faulty organization and the overloading of the chief executives with detail. The Construction Division had to be an organization which, as far as possible, would eliminate delays because it had to furnish other branches of the War Department facilities essential to their production programs.

SECTION 26.

ENGINEERING DIVISION.

DUTIES.

This division establishes the fundamental engineering principles, standards, and requirements for the work of the Construction Division. For this purpose it—

(a) Maintains a corps of advisory engineers experienced in matters of building construction, water, sewers, roads, drainage, plumbing, heating, lighting, power, railroads, docks, fire protection, mechanical equipment, estimating costs, scheduling materials, and other elements entering into construction.

(b) Keeps in touch with the material situation through the procurement division, with a view to controlling design, so that the most available material for the purpose will be used.

(c) Consults with the maintenance and repair division, so as to get the benefit of the data available from operating experience.

(d) Prepares such fundamental data, general plans, and instructions as are necessary in connection with each project. In cases where it may be so determined the general plans may be prepared by other bureaus and delivered through the engineering division.

(e) Maintains standard plans and specifications for all construction work for which standardization is advisable.

(f) Aids in the preparation of estimates of cost of projects when advisable.

(g) Draws up the required bills of material entering into construction and delivers same to the proper supervising constructing quartermaster.

(h) Is responsible for seeing that, at the completion of the project, record plans for the same are prepared in duplicate where necessary, and one set in all cases delivered to the maintenance and repair division in Washington.

OFFICE PROCEDURE.

The organization of the engineering division consists of an officer in charge, with an assistant; a corps of advisory engineers; and an expediting officer, assisted by a corps of expediting engineers. The following rules were issued:

(1) The expediting officer will secure from the requirements section and from other available sources the requirements for all projects, will direct and coordinate the preparation of plans for these projects, will supply data to the requirements section and to other sections as required, and will be the source of information regarding the work being designed. In general, he will be the executive officer in regard to the preparation of drawings and specifications in the engineering division for work handled by the construction division.

(2) The Washington office will serve as a principal place of contact between the building division and the engineering division in all matters relating to plans and schedules.

(3) Through the expediting engineers the Washington office will furnish plans and schedules of materials directed to the supervising constructing quartermasters at the earliest possible moment after work is authorized.

(4) Expediting engineers are to be responsible for the delivery to supervising constructing quartermasters of all necessary plans, schedules, and specifications for projects coming under the building division with which they are assigned to work. They will call upon the advisory engineers for such information as these officers are

responsible for. The expediting engineers will be the contacts through which the supervising constructing quartermasters usually communicate with the engineering division as to engineering matters on projects of the respective sections.

(5) The expediting engineers will report through the expediting officer and will be held responsible for the expediting through the office of any engineering work coming into their particular sections, and they will be required to keep an accurate record of the history and progress of their jobs through the Washington office.

(6) The expediting officer and expediting engineers will also keep in touch with the various bureaus whose work they handle, with a view to maintaining close contact and interchange of information. It is possible that this phase of the work may develop to such an extent as to require handling by liaison officers.

The expediting officer is in charge of two drafting rooms, one a general drafting room, including document and blue-print files, and the other a civil engineering drafting room.

The advisory engineers are divided into 11 sections and there is also an advisory architect with duties outlined as follows:

(1) The advisory engineers will prepare general plans and specifications of the utilities for the various projects. They will also prepare estimates, reports, recommendations, and schedules, when these items are required, and will be responsible for collecting the necessary data for these purposes.

(2) Plans prepared by the advisory engineers will be delivered to the expediting officer for the section involved, schedules to the scheduling section, estimates to the estimating section, other papers to the person requesting them.

(3) Letters conveying technical information to the constructing quartermasters when written by the advisory engineers will be initialed by the writer responsible, but will be signed by supervising constructing quartermasters.

(4) The advisory architect will be consulted on requisitions for any new additional architectural construction at camps, cantonments, and posts. He shall make recommendations as to the necessity for the proposed work. The requirements section will then take the necessary action in accordance with these recommendations.

(5) In general, the recommendations from the constructing quartermaster, when approved by the commanding officer, should be sufficient evidence for approving the location of individual or unimportant structures in camps, cantonments, and posts, except where these recommendations conflict with the rules laid down for fire protection. The advisory architect will be consulted on the location of buildings falling outside of the above general rules, and will also be consulted on such cases falling within the above general rules as seem to require special consideration.

(6) He will be freely consulted as to the size and character of buildings to be erected for new camps, particularly with reference to the arrangement and sizes of buildings to fit the military organizations.

PERSONNEL.

Officer in charge, Col. F. M. Gunby.

Assistant, Col. Lincoln Bush.

Expediting officer, Maj. H. J. Burt.

Expediting engineers:

Sections A and B, camps, Mr. A. B. McDaniel.

Section B, hospitals, Capt. J. H. Clark.

Section C, storage and terminals, Capt. A. I. Jackson.

Section D, ordnance depots and proving plants, Mr. H. E. Vandertip.

Section E, aircraft production and military aeronautics, Maj. V. H. Cochrane.

Section E, housing and unclassified, Mr. C. M. McClure.

Section F, Regular Army and Coast Artillery posts, Mr. D. V. Allen.

Advisory architect, Lieut. Col. F. B. Wheaton.

Advisory engineers:

Camp planning, schedules of buildings, Maj. G. Gibbs, jr.

Water-supply, Lieut. Col. D. H. Maury.

Fire protection, Maj. C. Goldsmith, Mr. N. L. Newell.

Electric power and illumination, Maj. N. J. Neall, Maj. E. T. King.

Heating and plumbing, Maj. L. H. Tripp.

Schedules of materials, Maj. G. G. Will.

Refrigeration, Capt. L. R. Phillips.

Estimates, Capt. E. R. Nichols.

Mechanical equipment, Maj. J. B. Blake.

Sewers and sewage disposal, Maj. L. S. Doten.

Camp transportation facilities, Maj. J. H. Phillips.

COMMENTS AND CONCLUSIONS.

The activities of the engineering division have been stated at length in Part II, in the section on "Organization and methods adopted for handling emergency construction of cantonments and camps." It is therefore unnecessary to review them here further than to state that the organization was expanded to handle the work of the enlarged construction program and to comment on some of the important changes.

Engineering duties under the reorganization consisted largely of advisory services to the section chiefs of the building division. The advisory engineers were divided into sections, each specializing in a separate branch of engineering.

A new section, camp transportation facilities, was added in July, 1918, which had charge of the engineering for the transportation systems of all projects, excepting those coming under section C, which had charge of storage and traffic, terminals, lighters and warehouses. The camp transportation section designed railroad connections, highways and other transportation facilities. It was instructed to consult the department of military railways of the Engineer Corps in regard to railroad facilities and layouts.

The standards for turnouts, frogs, switches, etc., as approved by the director of military railways, Engineer Corps, were used. All rail, fittings and other railroad material, including railroad contractors' plant and equipment such as steam shovels, locomotives and gantry cranes, etc., used by the Construction Division were obtained through the department of military railways.

Expediting engineers assigned to the several sections of the building division were responsible for the prompt handling of work for their respective sections.

This organization and method is reported to have operated very satisfactorily and its capability of expansion fitted well with the rest of the Construction Division's organization.

The creative work of the Construction Division is done by the engineering division. In planning and designing the cantonments and camps, the standards adopted and the use of typical plans were perhaps the most important decisions at the beginning of the undertaking.

The designing of the war projects, when time was a vital factor, necessitated close cooperation between the designers and the industries producing building materials throughout the United States. Designs were necessarily governed by the supply and price of available material and often the changing of important features almost overnight was required to meet the variations in supply. It was necessary for the designers to make informal advance commitments with manufacturers to avoid making radical changes in plans because of future market conditions.

For the economical design of projects, material must be selected which is available in local markets. As an instance, it is impracticable and uneconomical to design structures for the Pacific coast using material manufactured in the East or Middle West. The cooperation needed between the designers and the manufacturers, and the economical selection of materials, is impracticable when one organization designs and supervises construction and another separate organization endeavors to supply the materials. It was often necessary to transfer materials from one project to another to keep work going at top speed.

In construction work it is often impossible to determine in advance the character and amount of materials necessary. In the case of standardized supplies such as clothing, provisions, etc., storage acts as a reservoir between purchase and delivery and assures the latter, while on construction work this can seldom be done as economy requires that most of the material should be manufactured to meet the special requirements of each project. Seldom can material for construction work be specified in advance. This fact is well recognized in commercial life where corporations maintaining purchasing organizations do not often purchase large amounts of construction materials far in advance of proposed construction. As a rule this material is furnished by the contractor for the work, and is manufactured according to specifications for a particular project.

The Board of Review is of the opinion that the engineering division of the Construction Division was efficient and that its work compares favorably with that done by like organizations in large civilian engineering, architectural and contracting firms. It cooperated quickly and effectively with other bureaus or corps of the War Department and with other branches of the Construction Division.

The board is convinced that the functions of design, construction and procurement of materials should, together with authority, responsibility and accountability, be placed with one division, corps or department; that it should perform all nontechnical War Department and Government construction work; and that such division or agency should, when necessary, cooperate with other Government agencies in the clearance and allocation of projects and of the material and labor therefor.

SECTION 27.

CONTRACTS DIVISION.

DUTIES.

The contracts division institutes the fundamental standards and policies relating to contracts and leases by:

(a) Passing upon all contracts and subcontracts before they are signed either by the officer in charge of the Construction Division or the constructing quartermaster.

(b) Attending to all matters relating to surety bonds, fire insurance, workmen's compensation, and employers' liability insurance.

(c) Rendering opinions on points arising in connection with interpretation of contracts.

(d) Determining what contract matters shall be submitted to higher authority for opinion.

(e) Representing the Construction Division in the procuring of additional lands where necessary for any project.

(f) Authorizing commandeering and requisition orders for the Construction Division.

OFFICE PROCEDURE.

The contracts division is divided into two sections: (1) Contracts section, (2) insurance section. There was formerly a real estate section but after the organization of a real estate unit in the Division of Purchase, Storage, and Traffic, which now handles real estate matters for the War Department, the former section ceased to direct real estate affairs except in connection with the cantonments and camps.

PERSONNEL.

Officer in charge, Col. Evan Shelby.

Assistants to officer in charge, Maj. A. S. Luria, Maj. Walter S. Hopping, Maj. A. A.

O'Brien, Capt. Wm. De Forest Manice, Capt. Eugene P. Kealy.

Officer in charge of insurance, Capt. Francis S. Bacon.

Officer in charge of real estate, Maj. Fred J. Wood.

Assistant in charge of real estate, Capt. Ralph H. Case.

CONTRACTS.

The contracts division prepares construction contracts and bonds and attends to their execution by contractors and by the authorized Government officials. Much of the work of the contracts division

consists of the interpretation of questions arising under the standard Contract for Emergency Work. The constructing quartermasters on the various projects require prompt decisions and rulings from the chief of the Construction Division who, in turn, calls on the contracts division for advice.

Aside from the principal contracts executed for the Government by the Construction Division with general contractors, there were many subcontracts on each project. It was required that the names of at least two candidates for a subcontract be submitted for approval. Each subcontract was submitted by the constructing officer in charge to the Construction Division for approval. The subcontracts also were made upon the standard contract form and provided for compensation on the cost plus a sliding scale with fixed maximum limit fee.

The contracts division prepares the engineering and other special service contracts. It draws contracts for rental of equipment, such as dredges, ditching machines, locomotives, etc. It prepares opinions on questions of law when requested by the Judge Advocate General's office. It prepares commandeering orders for the taking of materials, supplies, and plants and requisitions for the taking of real estate, both by fee title and leases. It also advises with the maintenance and repair division of the Construction Division as to the many leases made by the latter.

SURETY BONDS.

Contractors are required to furnish faithful performance bonds on all Government construction work. These are passed on as to sureties, amount of premium, etc., by the contracts division. It is stated that this supervision effected a substantial saving in the cost of these construction bonds.

INSURANCE.

The inspection section of the contracts division passed on, as to form and premium, and approved and recorded thousands of insurance policies covering fire, workmen's compensation, employers' liability, public liability, and other forms of insurance.

Fire insurance was not taken out by contractors but was obtained by the Government at special rates, which covered the risk on contractors' materials after the railroad's liability ceased, and until the material was delivered and accepted by the Government. It then became Government property and no further insurance was carried.

The Government required the contractors to carry workmen's compensation or employers' liability insurance for the protection of their employees, as required by the laws of the several States in which the projects were located. In the States where workmen's compen-

sation was not available, employers' liability insurance was required to the amount of \$5,000 for one person or \$20,000 for one accident, with full medical attention.

Public liability insurance was carried within the same limits. Automobiles and teams carried liability insurance on property, to a damage limit of \$1,000, in the operation of which the contractor was subject to suit because of his ownership, control, or operation.

No other forms of insurance were authorized.

It is the policy of the Government to carry its own insurance on Government employees, the method of procedure being that prescribed in the Manual of the Quartermaster Corps.

REAL ESTATE.

In most cases the area secured for the original cantonments and camps was inadequate and additional land had to be obtained. The contracts division of the Construction Division had to negotiate for the necessary land and to arrange for its purchase or condemnation up to the latter part of July, 1918, when a consolidation of the purchasing of real estate was effected and a real estate unit established in the office of the Director of Purchase, Storage and Traffic to handle the acquisition of all real estate for the War Department.

OTHER ACTIVITIES.

Representatives of the contracts division were also called upon to settle legal matters in the field. Agreements often had to be made with owners of adjoining land before construction could proceed and officers were sent from the contracts division to negotiate such adjustments.

CONTRACT FOR EMERGENCY WORK.

The Revised Statutes of the United States provide that detailed plans or specifications must be prepared for contracts for construction work or supplies and be followed by advertisement for the submission of sealed bids and by the award of contract to the lowest properly qualified bidder. The statute further provides, under section 3709, that in case of an emergency the head of a department may adopt other methods under which advertisement may be dispensed with and contracts let directly. Under this provision the Secretary of War, on April 12, 1917, declared an emergency to exist so as to legalize the making of many contracts for war supplies and facilities that were urgently needed.

The experience gained in the use of the Standard Contract for Emergency Work had proved its effectiveness. As there was some criticism of it by Congress, by some disappointed contractors and others, the Acting Secretary of War, in March, 1918, directed that a

study be made of the various methods which might be employed in order to determine whether some better plan of executing emergency construction work could be developed. Pursuant to these instructions, the Cantonment Division invited a committee of prominent citizens "to consider the conditions to be met in executing construction work of the War Department in the United States made necessary by the war, and to advise as to methods for future work."

This committee consisted of:

John R. Alpine, general president United Association of Plumbers and Steam Fitters, representing the American Federation of Labor.

Frederick L. Cranford, president General Contractors Association of New York, Brooklyn, N. Y.

Charles T. Main, president American Society of Mechanical Engineers, Boston, Mass.

John Lawrence Mauran, president American Institute of Architects, St. Louis, Mo.

Oscar A. Reum, representative of the president of the Building Construction Employers' Association, Chicago, Ill.

R. G. Rhett, president United States Chamber of Commerce, Charleston, S. C.

E. W. Rice, president American Institute of Electrical Engineers, Schenectady, N. Y.

A. N. Talbot, president American Society of Civil Engineers, Urbana, Ill.

A report signed by all members of this committee was presented on March 15, 1918. This indorsed the standard form of Contract for Emergency Work and recommended that its use be continued. A copy of the report is hereto annexed as Exhibit No. 3.

REVISIONS OF CONTRACT FOR EMERGENCY WORK.

The first edition of the standard contract used in June, 1917, allowed the contractor a fee of 10 per cent for construction work costing less than \$100,000. As the cost increased this percentage diminished on a sliding scale, with lump-sum fees applying between specific cost limits and a fee of 6 per cent on a cost in excess of \$3,500,000. It was stipulated, however, that the total fee of the contractor in no event exceed \$250,000. In this first edition of the standard contract the name of Maj. W. A. Dempsey, Quartermaster, United States Reserves, was printed as "Contracting officer."

The second edition of this contract, issued in October, 1917, left a blank for the name of the contracting officer. The contractor's performance bond had been fixed at \$250,000 in the first edition, drafted for the cantonment work. In the second edition this amount was left blank, as the size of new projects was expected to vary widely, but the total fee was still limited to \$250,000.

The third edition, issued in February, 1918, had material changes. Under "Determination of fee" the fee of 10 per cent on costs less than \$100,000 was reduced to 7 per cent. This fee was decreased on a sliding scale as the cost of the work increased, being broken by lump-

sum fees applying between specific cost limits. The last items of the schedule of fees read as follows:

If the cost of the work is over \$9,650,000 and under \$10,000,000 a fee of $2\frac{1}{2}$ per cent.

If the cost of the work is over \$10,000,000, a fee of \$250,000.

The clause respecting the total fee was also changed and made to read as follows:

The total fee to the contractor hereunder shall in no event exceed the sum of, anything in this agreement to the contrary notwithstanding.

It was thereafter the practice of the contracting officer to insert, in the blank space of this clause, an amount ascertained by applying the schedule of fees to the estimated cost. The effect was to eliminate any incentive for the contractor to increase his fee by exceeding the estimated cost. The Government retained the authority to reduce the fee if the actual cost were less than the estimated cost. The omission of this clause, in the first and second edition of the standard contract, was not important as to the National Army cantonment work, because the cost of these projects averaged nearly \$10,000,000 each. A saving in fees would have been effected, however, if this clause and practice had been made effective for the construction of National Guard camps and for some of the miscellaneous contracts let under the second edition.

In the first and second editions of the standard contract the general contractor received a fee of 5 per cent on the cost of the work done by subcontractors. In the third edition the contractor's fee on such subcontract work was cut to $2\frac{1}{2}$ per cent, the schedule of rental rates was changed, and a wider variation was allowed in rental prices for equipment.

The fourth edition of the standard contract, issued in June, 1918, carried an affidavit which was appended to the contract and was to be signed by the contracting officer, that the contract made by him and the contractor was fair, was without any benefit or advantage accruing to himself, or allowing any such benefit or advantage corruptly to the contractor or any other person, and that the accompanying papers were all those relating to the contract.

The board concurs in the views and recommendations of the special committee of experts which, on March 15, 1918, reported on this form of contract. In Part I hereof it has stated its views, suggestions, and findings thereon in general terms and in detail. After careful study of War Department construction in the United States the board is of the opinion that this or some essentially similar form of contract and method of doing the work was necessary in order to obtain the requisite speed and quality of work and to safeguard the vital interests of the Government.

Some bureaus and corps of the Government and War Department did not adopt this form of contract or its scale of fees, and it is stated that many contracts in the Navy, in the Ordnance Department, and in other departments were let on a basis of cost plus 10 per cent. By using the standard Contract for Emergency Work instead of this basis the Government would have saved many millions of dollars. It is unfortunate that the Government did not generally adopt and use this standard form of contract.

The cost of Government construction projects usually exceeded the estimates. This was largely due to the advances in material and labor prices and to the fact that labor became scarcer and less efficient. Almost without exception the work planned for the various projects was increased. For the foregoing reasons it is perhaps safe to say that half the work performed by the Construction Division was done at the fixed limit prescribed in the standard contract, i. e., at the lowest percentage fee. The average fee paid to contractors on the cantonments was less than 3 per cent. This had to refund him his overhead and fixed charges and cover any profit received. Many contractors were ready and willing to undertake this work on these terms, for patriotic and other reasons. Moreover, there being little other work offering, it kept their organization intact. This was also greatly to the Government's interest.

CONTRACTORS' FEES.

The fees paid general and subcontractors on War Department work done under the Contract for Emergency Work were not high. On the contract they were exceedingly low as compared with the fees paid on prewar private construction. The total fees to the original general contractors for the 16 National Army cantonments amounted to 2.84 per cent of their cost and on the National Guard camps to 6.88 per cent of their cost, all these projects being done under the first and second editions of the Contract for Emergency Work, which allowed higher percentages on the lower costs than the later editions.

The total of all fees earned by general and subcontractors on 15 projects on which the data was available, including 7 cantonments, 1 artillery camp, 1 proving ground, 1 Army supply base, 1 picric acid plant, 1 nitrate plant, 1 storage depot, and 2 bag-loading plants and on which the expenditures as of June 30, 1919, were \$161,629,507. 10 amounted to \$5,861,018.05, which is 3.63 per cent of the cost of the work.

A copy of the fourth edition of the Contract for Emergency Work will be found annexed hereto, Exhibit No. 2.

CONTRACTS FOR SUPERVISING ENGINEERS.

Of the three forms of contracts for the services of supervising engineers the use of Form No. 2, for general engineering, in which the fee was placed at three-fourths of 1 per cent of the total final cost of the construction project, was discontinued after its use on the first three cantonments, viz, Devens, Gordon, and Lee, as the fees obtained by this method were considered too large.

Form No. 3 was used on all subsequent projects requiring general engineering, and the supervising engineers' duties were extended to cover whatever engineering was necessary to be done on the basis of an arbitrary fixed sum, based on the size of the project, length of time necessary for completion, and character of service required. Some slight variations and additions were made to the form as originally drawn by the subcommittee on engineering of the committee on emergency construction of the General Munitions Board. These changes included:

1. Changing the designation of the officer representing the Government from constructing quartermaster to contracting officer.

2. The addition of an article preventing the assignment of the contract.

3. The addition of an article preventing the employment of convict labor.

4. The addition of an article providing against the payment of a contingent fee to any third person for soliciting or obtaining a contract or causing or procuring the same to be obtained upon compensation in any way contingent, in whole or in part, upon such agreement.

The full report of the subcommittee on engineering of the committee on emergency construction of the General Munitions Board on compensation of engineers on construction work will be found annexed hereto, Exhibit No. 4.

ENGINEERING FEES.

The services required of a supervising engineer varied greatly on different projects depending upon the character of work entrusted to his care, the ability of his organization and the number of technical experts who were assigned to the commissioned staff of the constructing quartermaster.

The engineers of the country who were called upon to act as supervising engineers responded in a most satisfactory manner. Their attitude was one of willingness to render every engineering service asked of them, regardless of compensation or of their contractual obligations.

The supervising engineer handled the ordinary engineering problems and on projects involving industrial processes, such as the manufac-

ture of powder, acid, etc., or where the process was a new one; consulting engineers were also employed for research work and for designing and supervising the installation of the special manufacturing plant.

The fees paid to supervising engineers, except on the three cantonments already mentioned and a few other projects, and the salaries paid to their assistants, were very small in comparison with the responsibilities involved and the fees commonly paid for similar services on private work. Many of the assistant engineers and other members of the engineering staffs were paid less than skilled labor. Plumber, carpenter, and bricklayer foremen, under the union scale of wages paid, often received more than the principal assistant engineer, whose maximum salary was limited by the contract to \$350 per month. Common labor was paid as much and more than the transitmen, draftsmen, and inspectors of the supervising engineer's staff.

On 16 National Army cantonments, averaging in cost about \$9,000,000 at the termination of the engineering contract, the supervising engineer's fees averaged about \$15,300, which is less than two-tenths of 1 per cent of the actual cost of the work, including the three cantonments above mentioned, on which the fee was fixed at three-fourths of 1 per cent.

On the 16 National Guard camps averaging in cost \$2,460,000 at the termination of the engineering contract, the fees averaged \$2,438, or slightly less than one-tenth of 1 per cent.

The Board of Review finds that on 87 projects, costing \$497,697,948, the supervising engineers' fees amounted to \$850,880.51, or a percentage of one-sixth of 1 per cent of the total cost of the work.

A comparison of the salaries of the engineering staff and the wages paid labor is as follows:

Engineering staff, maximum monthly salary:

Principal assistants.....	\$350.00
Assistant engineers and designers.....	250.00
Instrument men.....	175.00
Draftsmen.....	125.00
Assistant clerks and rodmen.....	90.00

Labor monthly wage, 10-hour basis:

Plumber foremen.....	354.30
Bricklayer foremen.....	354.30
Carpenter foremen.....	315.30
Plumbers and bricklayers.....	306.90
Electricians and carpenters.....	291.00
Common labor foremen.....	150.00
Common labor, first class.....	120.00
Common labor, second class.....	105.00

SECTION 28.

PROCUREMENT DIVISION.

DUTIES.

This division institutes the fundamental standards and policies required for providing the Construction Division with material and the inspection of the same where this is done at the source. For that purpose:

(a) It mobilizes all of the principal materials required by the Construction Division. This mobilized material ordinarily constitutes all of the materials needed for a project except articles of incidental importance. It may be determined that such latter articles can be more advantageously purchased from local stock. Emergency reasons may also necessitate purchasing a small amount of principal materials from local stock on hand at the site of the project.

(b) It handled the clearance and allocation of supplies through the War Industries Board.

(c) It handled all applications for priority with the priorities committee of the War Industries Board.

(d) It acts as the procuring bureau for other divisions of the Army when so designated by the Director of Purchase, Storage and Traffic.

(e) It sees that supplies required by the Construction Division are procured through the proper bureau where a consolidation of procurement has been accomplished.

(f) It cooperates with the Inland Traffic Service on all matters relating to the ordering or cars, routing and transportation of freight and express.

(g) It purchases direct such equipment as may be from time to time decided upon as not physically attached to a construction element.

(h) It keeps in touch with the supply of materials with the end in view of furnishing information which will be of service in regard to the proper materials to be considered for various future projects.

(i) It inspects through a corps of properly qualified men at point of shipment the various kinds and classes of material which it is considered advisable to inspect before loading rather than after arrival at destination.

(j) It follows the progress of every order placed, beginning with its receipt by the manufacturer until shipment has been actually made. This is accomplished through the agency of a corps of field expeditors attached either to the procurement office in Washington or to branch offices maintained in various production centers.

OFFICE PROCEDURE.

Requisitions for materials are based on schedules prepared by the engineering division or in the field. Such requirements are forwarded to the procurement division through the supervising constructing quartermaster who reviews all requisitions, especially with reference to dates and sequence of requested deliveries.

The procurement division is divided into two principal branches, materials branch and delivery branch.

MATERIALS BRANCH.

The materials branch is charged with the responsibility of disposing of all matters related to, or associated with, the allocation of materials.

This branch is subdivided into three sections, each in charge of a section supervisor, and into 11 units, as follows:

Section A:

- (a) Stoves and special equipment.
- (b) Steel.
- (c) Lumber and millwork.
- (d) Hardware and roofing.

Section B:

- (e) Water supply and fire protection.
- (f) Refrigeration.
- (g) Building material.
- (h) Plumbing.

Section C:

- (i) Steam heating.
- (j) Mechanical equipment.
- (k) Electrical equipment.

These units are assisted by the office of the contract officer, whose duties are to expedite the progress of material requisitions through the materials branch and to sign orders when ready for issuance.

Routine of procurement.—Requisitions for materials, as received from the engineering division through the supervising constructing quartermaster, bear the number of the project for which the material is to be procured, and this project number appears on the purchase orders or authorizations when issued to the vendors.

Requisitions for materials, on delivery to the materials branch of the procurement division, are recorded by the project and serial number and then immediately referred to the proper unit for procurement.

The purpose of the record made of such materials requisitions is that the contract officer may keep informed daily of the progress being made in respect to each requisition, to the end that there be no delay, by loss of requisition or otherwise, in the actual placing of the order.

On receipt by the head of any of the materials units of a requisition for any given commodity that is on the clearance list, a preliminary survey of the field is made and prices obtained, so that immediately clearance is obtained the units may be ready to proceed with purchase. After clearance has been granted, tabulations are made by the procuring officer, submitted to the section supervisor for his approval, and then submitted to the Board of Contract Review. Each procurement is reviewed by this board and authority to purchase is stamped on the tabulations, authorizing the procurement. The orders or authorizations are then filled out en bloc and submitted to the contract officer, who compares the tabulation with the order as drawn and affixes his signature as the contract officer.

Purchase authorizations.—Ten copies of all purchase authorizations or orders are issued as follows:

(a) First copy is forwarded to the manufacturer or supplier and bears notation as follows: "You are hereby authorized to proceed with the immediate production of the following material." This original authorization also advises the manufacturer or supplier that the constructing quartermaster has been instructed to direct the contractor to forward confirming order promptly.

(b) Second and third copies are forwarded to the constructing quartermaster, one of which he retains for his files, and the other he delivers to the contractor, which serves as notice to the latter that confirming order must be promptly issued by him to the manufacturer or supplier indicated, in accordance with the prices, terms, and delivery specified in the order.

(c) Fourth copy is forwarded to the supervising constructing quartermaster, for the purpose of informing him that the material in his requisition of corresponding serial and project number has been ordered, and of the date it is to be shipped and delivered to his particular project.

(d) Fifth copy is forwarded to the procurement division file for its permanent record.

(e) Sixth copy is forwarded to the general file as a Construction Division record.

(f) Seventh copy is forwarded to the delivery branch for the purpose of expediting production and accomplishing delivery within the specified time limit.

(g) Eighth and ninth copies are forwarded to the inspection unit, one of which is forwarded by the inspection unit to the inspector's assistant to inspect the material covered by this order, and the other is held in the office of the inspection unit to check against the inspector's report.

(h) Tenth copy is marked "Extra." and is returned to the individual procuring officer who placed the order.

The copies for the general file and the procurement division file are accompanied by a copy of the tabulation, so that each file copy of the order issued to the manufacturer is a complete history in itself of the transaction.

DELIVERY BRANCH.

This branch is divided into three principal units as follows:

Production unit:

- (a) This unit follows the progress of each order by letter, telegraph, telephone, or personal visit until complete shipment has been accomplished.
- (b) In cases of emergency it cooperates with manufacturers holding Government orders, in the allocation of raw materials, the securing of priorities, labor, fuel, and electric power sufficient to turn out such orders on specified time.
- (c) It keeps on file information showing which manufacturers working on Government orders meet promptly the specified shipping dates. This record is of special value to the buyers of the materials branch in helping them determine with what manufacturers certain orders should be placed, as far as expecting prompt shipment is concerned.
- (d) The main office of the production unit maintains a record of all orders in process of production, and directs the movements of the field corps, and of the several branch offices located as follows: Chicago, Ill.; Pittsburgh, Pa.; New York, N. Y.; Norfolk, Va.; New Orleans, La.; Jacksonville, Fla.; St. Louis, Mo.

Inspection unit:

- (a) The inspection unit is divided into seven subunits, each handling a definite class of material as follows:
 - (1) Mechanical equipment.
 - (2) Electrical equipment.
 - (3) Steel products.
 - (4) Building materials.
 - (5) Brick and fireproofing.
 - (6) Lumber and piling.
 - (7) Heating and refrigeration.
- (b) Each subunit is in charge of a section head who is a technical expert in his line, so that it operates as a unit, and is in continuous possession of all details of each and every requisition being inspected.
- (c) In addition to the purely technical units, there is an administrative officer who has charge of all matters of travel, rules and discipline; and a special investigator who acts as the representative of the inspection unit on matters requiring special action.
- (d) The actual field of operations is divided into seven districts, each in charge of a district inspector. These district inspectors assign individual inspectors to the work and maintain a close relationship with the manufacturers in their districts, and are familiar with the possibilities of these districts as producing centers. These offices are located as follows: Chicago, Ill.; New York, N. Y.; Pittsburgh, Pa.; Detroit, Mich.; Norfolk, Va.; Jacksonville, Fla.; St. Louis, Mo.
- (e) In the fall of 1918 the field force of inspectors consisted of approximately 200 men.
- (f) Reports are made by inspectors daily showing progress of manufacturer, whether materials are running according to specifications, the quantity of rejections, if any are made, with reasons for such rejections.
- (g) The inspection unit in addition to its duties in connection with the inspection of materials is an intelligence department, and not the least important function of this unit is to supply comprehensive statements in regard to general conditions in various localities, and specific information in respect to manufacturing plants which come under the observation of the inspectors in the field.
- (h) The inspection unit, while in effect a separate and distinct organization from the production unit, is closely coordinated with the latter, and all inspectors, in addition to their duties in connection with inspection of materials are charged with the responsibility of expediting production. It is the duty of each inspector when assigned to any plant to inspect any material, to inform the inspection unit as to the amount of material on hand and in the plant which is available for the execution of that particular order, how much additional material is required, the date of completion as it appears on the manufacturer's schedule, whether any assistance is apt to be required by the manufacturer in securing this additional material, and to advance such other information as may be valuable to the production unit in determining whether that particular order will be completed within the required time limit. This information when received by the inspection unit is promptly turned over to the production unit.
- (i) A special function of this unit is the temporary supplying of technical experts to any of the construction projects on request of the supervising constructing quartermaster, to investigate or test the operations of any piece of equipment or machinery. Careful studies have been made as to the

Inspection unit—Continued.

condition of prepared roofing at many of the cantonments, and reports made showing some of the faults of methods of application and how these may be remedied. This unit is prepared to conduct similar investigations on any line of construction. The recommendations made from such studies result in a considerable saving and expense to the Government and in greatly increased efficiency.

Transportation unit:

- (a) This unit is a branch of the Inland Traffic Service. It submits to the Inland Traffic Service requests for transportation permits known as "War Department transportation orders," which may be required to cover movements of materials into restricted territory.
- (b) It also acts in an advisory capacity to the various branches and units of the Construction Division, making recommendations as to routings, submitting rates, etc.
- (c) It takes care of embargoes, questions of car shortage, solid train movements, and such other matters as generally come within the scope of a transportation unit.
- (d) Additionally, it is responsible for avoiding congestion at any project, and no orders for material can be placed by any officer for any project without the approval of the officer in charge of the transportation unit.

INTERBUREAU UNIT.

This unit was established later for the purpose of handling matters relating to the interbureau purchases. It disposes of requests for clearance and allocation, and receives and transmits all papers concerning interbureau transactions and purchases of materials.

The officer in charge of the materials branch was relieved from detail in this unit by the three section supervisors who were selected from among specialized experts in close touch with market conditions. While they relieved the purchaser of the responsibility of making the final decision on the purchase they did not relieve him from the duties or responsibilities of arranging the purchase. Approval of purchases by the section supervisor operated to prevent errors from going to the Board of Contract Review, whose duties were those of judgment and policy rather than questions of detail, and to insure that when a tabulation was ready to be submitted to the Board of Contract Review, it was in the proper form and in accordance with the best judgment of the section supervisor.

BOARD OF CONTRACT REVIEW.

This board is composed of the head of the procurement division, his immediate assistant, officers in charge of the materials and delivery branches, contract officer of the materials branch and officers representing the contract, building, engineering and accounting divisions. The board meets daily to review all purchase orders before they are issued to the vendors.

The creation of the Board of Contract Review constituted a novel protective feature of much value. The board was composed, as

stated, of the principal officers of the procurement division and a representative from each of four other divisions of the Construction Division and was divided into subcommittees each of which assumed responsibility for one class of commodities.

The purchaser's recommendation, approved by the section supervisor, was submitted, with the bids and tabulations, to the proper subcommittee of the Board of Contract Review and approved or rejected by it. If approved, it was so marked and returned to the purchaser and was his authorization for making the contract with the vendor. The purchase authorization was then attached to the procurement order and sent to the contract officer for his signature. This procedure relieved the purchaser of a part of the responsibility of awarding the contract. For example, if, among the bidders on a piece of machinery, one bidder named a quicker delivery than a lower bidder, and a recommendation to purchase from the former was made by the engineering division, it constituted a part of the record of the transaction.

Each purchase was passed upon by four bureaus before the purchase was made: i. e., by the purchasing officer, by the section supervisor, by the Board of Contract Review, and by the contract officer. This secured the independent judgment of experienced chiefs and prevented possible collusion between the purchaser and the vendor.

Criticism has been made of other War Department bureaus and Government departments because of the placing of orders by inexperienced subordinate officers, or with concerns whose stockholders or former employees participated in the selection or purchase negotiations without adequate checking of such actions. The plan adopted by the Construction Division seems to meet this criticism. It undoubtedly saved money and time.

PERSONNEL.

Officer in charge, Col. J. N. Willcutt.

Assistant, Lieut. Col. J. N. Pease.

Officer in charge of materials branch, Maj. O. F. Noss.

Assistant, Capt. M. Fuhrer.

Section A—Supervisor, Mr. W. C. Bogue.

Unit (a), stoves and special equipment, Capt. R. C. Smith.

Unit (b), steel, Maj. H. F. Doeleman.

Unit (c), lumber and millwork, Capt. G. M. Chambers.

Unit (d), hardware and roofing, Mr. A. P. Chandler.

Section B—Supervisor, Maj. D. B. Stokes.

Unit (e), water supply and fire protection, Capt. M. O. Pinkham.

Unit (f), refrigeration, Mr. J. H. Prentiss.

Unit (g), building materials, Mr. R. S. Teel, Capt. A. E. Harding.

Unit (h), plumbing, Maj. J. C. McCubbin.

Section C—Supervisor, Mr. E. C. Morse.

Unit (i), steam heating, Capt. E. W. Case.

Unit (j), mechanical equipment, Capt. A. C. Nell.

Unit (k), electrical equipment, Maj. J. H. Klinck.

Officer in charge of delivery branch, Lieut. Col. H. S. Durant.

Production section—

Officer in charge, Capt. A. B. Nash.

Assistant, Capt. C. S. Hayes.

Transportation section—Inland Traffic Service, Mr. C. E. Denney.

Inspection section, Capt. F. W. Hatten.

Interbureau section, Capt. A. J. Allen.

Tabulations and statistics section, Mr. R. N. McGuire.

Principal clerk, Mr. J. N. McLeod.

Contractor officer, Capt. C. M. Foster.

COMMENTS AND CONCLUSIONS.

In considering the procurement of materials by the Construction Division, it is to be noted that the method of purchasing differed from that usually used by the purchasing department of a large corporation. The terms of the Contract for Emergency Work required that all materials should be purchased and paid for by the contractor, who then submitted receipted vouchers for which the Government was to reimburse him.

It was the duty of the procurement division to obtain material from the manufacturer or bureau capable of supplying it at a satisfactory price and to arrange for its quick delivery. When these arrangements were made the contractor was notified where and at what price to place his purchase order. The procurement division also sent inspectors to the various plants, obtained cars and expedited shipments. Generally, material was not directly purchased or paid for by the Government.

As previously stated, in purchasing material for the construction of the cantonments and National Guard camps, the Cantonment Division dealt with the manufacturer or producer. At that time the Priorities Committee, Priorities Board, War Industries Board, Department of Purchase and Supply, Inland Traffic Service, and other Government war service bureaus and agencies which were later found necessary had not been organized.

In October, 1917, the Secretary of War decided that the Cantonment Division should be continued and act as the Construction Division for all Army work in the United States, and it was necessary to enlarge the duties of the procurement division and to employ experts to aid in procuring materials and equipment of a technical character.

During the fall of 1917, and the early spring of 1918, new conditions and problems arose due to the large demands made upon the markets, industries, and transportation facilities, causing on the railroads an inadequate supply of labor and an insufficient and rapidly decreasing fuel supply.

This situation necessitated governmental supervision of procurement, mobilization of industries, and regulation of transportation

and fuel distribution. The industries were thereafter gradually taken under the supervision of the Government, and the procurement division ceased to deal direct with manufacturers and abandoned its organization for the placing of orders.

Under this arrangement the procurement division obtained authority to purchase by submitting bills of material to the clearance committee of the War Industries Board through the Department of Purchase and Supply of the Purchase, Storage, and Traffic Division. After approval it was necessary to request the several commodity committees of the War Industries Board for an assignment of an order to a manufacturer able to make the required delivery without interference with orders placed by other bureaus.

Early in the summer of 1918 the War Department decided to organize and consolidate procurement. The several bureaus of the Army had previously purchased their supplies independently under the supervision of the War Industries Board, and competed with each other in purchasing and bargaining with the same manufacturers for prices and priority of delivery.

To eliminate this difficulty the Department of Purchase and Supply was organized, with the Director of Purchase, Storage, and Traffic in charge. This consolidation made it necessary for bureaus to place orders for various commodities and equipment through the War Department bureaus which were designated as the procuring bureaus therefor.

Under this revised plan the procurement division of the Construction Division became the Government bureaus' agency for securing cement, lumber, millwork, plumbing supplies, building materials, electrical equipment and supplies, building hardware, refrigerating machinery, structural steel, gravel, crushed stone, and sand.

The Construction Division was, however, required to procure some commodities from other bureaus of the War Department, as railway equipment, rope, telephone equipment, automobiles, machine tools, paints and varnishes, hand tools, vehicles, etc. As stated before, there were service bureaus in Washington which controlled the manufacture of certain commodities, and it was necessary to secure through these bureaus such materials as lumber, millwork, hollow building tile, cement, wall board, brick, lead, automatic sprinkler systems, steel wire and cable, cast-iron pipe, and electrical supplies.

As already stated, where the supply was inadequate it was necessary before purchasing to get clearance of material through the clearance committee of the War Industries Board. The following is a partial list of the commodities subject to clearance: Compressors, copper and lead, drawing instruments, electric cable, electric generators, electrical supplies, hardware, iron and steel, linoleum, lumber,

motors, oakum, plumbing and heating supplies, power equipment, pumps, transformers, turbines, typewriters.

The material supplied by the procurement division during the 18 months from June 15, 1917, to December 15, 1918, was valued at \$245,115,443.10. Some details are as follows:

Cement.—6,181,194 barrels, costing \$13,723,153, weighing 2,472,-477,600 pounds, and requiring 36,148 cars. This would make a train about 300 miles in length.

Brick.—325,783,400 brick, costing \$2,631,799, and requiring 15,730 cars.

Lumber.—2,880,000,000 feet, comprising yellow pine, fir, hemlock and other wood, costing \$74,888,000, and, estimating 20,000 feet to the car, requiring 144,000 cars. This would make a train about 1,200 miles in length.

Millwork.—Costing \$15,000,000 and requiring 7,500 cars.

Steel.—Totaling 64,000 tons and requiring 2,560 cars.

Crossties.—Costing \$3,960,000 and requiring 9,650 cars.

During the four months' period from July 1, 1918, to November 2, 1918, the procurement division purchased material costing \$94,294,-099.90, or, excluding Sundays, at the rate of \$906,674.04 daily.

SECTION 29.

ADMINISTRATIVE DIVISION.

DUTIES.

The administrative division institutes the fundamental standards and policies for the general administrative work of the division. In this connection it—

Establishes and approves all labor rates and supervises all labor matters and conditions at all projects and passes upon agreements in connection therewith, receiving labor delegations and adjusting wages. Cooperates with the War Labor Policies Board, the Emergency Construction Wage Commission, and the General Wage Conference.

Compiles and records all labor rates, conditions, and agreements.

Studies matters of organization and prepares reports concerning improvements in methods and coordinations among the various functions of the work.

Compiles from the various records all statistics covering cost and other special matters required in connection with reports to other branches of the War Department.

Supervises all matters connected with the employment, pay, and separation from service of civilian employees.

Attends to the issue of all travel orders for officers and civilians.

Keeps all records of the officers assigned to duty with the division.

Supervises clerical routine, records, files, mail and messenger service.

Purchases and distributes all office supplies and equipment.

Conducts a general information bureau.

- Conducts a publicity section for the preparation and release of all information or data for publication.
- Conducts a section for the promotion of patriotism among the working men by giving them correct information on the reason for our being at war and the attitude of the Government with relation to labor.
- Maintains a section to cooperate with any advisory civilian or military committees that may be formed for the purpose of studying the organization or the work performed by the division.

OFFICE PROCEDURE.

The administrative division maintains a number of sections, the names and functions of which are as follows:

The industrial service section handles all matters relative to labor arising out of the construction work of the division. Among specific matters it—

- Establishes all schedules of labor rates and prepares same for approval of the War Department representatives on the War Labor Policies Board in accordance with War Department General Order No. 58, series 1918.
- Supervises all labor matters pertaining to wages, hours, and conditions at all construction projects.
- Receives and deals with labor delegations.
- Adjusts wages in cooperation with the War Labor Policies Board and the Emergency Construction Wage Commission and the General Wage Conference.
- Compiles and records labor rates, conditions, and agreements.

The work is subdivided geographically into the following units:

- North Atlantic unit: Includes the States of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, and New Jersey.
- Middle Atlantic unit: Includes the States of Ohio, Pennsylvania, West Virginia, and Delaware.
- South Atlantic unit: Includes the States of Virginia, North Carolina, South Carolina, Maryland, and the District of Columbia.
- Southern unit: Includes the States of Georgia, Mississippi, Alabama, Louisiana, and Florida.
- Central unit: Includes the States of Missouri, Michigan, Wisconsin, Iowa, Illinois, Indiana, Tennessee, Arkansas, and Kentucky.
- Southwestern unit: Includes the States of Texas and New Mexico.
- Western unit: Includes the States of North Dakota, South Dakota, Montana, Wyoming, Colorado, Utah, Nebraska, Kansas, Oklahoma, Arizona, Minnesota, Idaho, Nevada, California, Oregon, and Washington.

The labor procurement section cooperated with the United States Employment Service in obtaining labor for the projects of the Construction Division and, in conjunction with the building division, established the priority of labor demand at various projects. It was also charged with the importation of labor from foreign countries and the island possessions of the United States. Under this section are the following units:

- Distribution unit: Having to do with the movement of labor from one project to another.

Importations unit: Takes charge of the transportation of the supply of labor brought in temporarily from insular possessions or foreign sources.

Field service unit: Studies administration details involved in the use of foreign labor.

The office service section has direct charge of the following units comprising general office necessities:

File and record unit: Has custody of and is responsible for the general records of the Construction Division.

Mail unit: Takes charge of the handling, distribution, and collection of incoming and outgoing mail.

Telegraph unit: Handles all telegrams in and out of the division.

Information unit: Receives visitors and directs them to proper officers.

Messenger unit: Maintains a messenger service for the general use of the division.

Mimeograph and multigraph unit: Produces all mimeograph and multigraph work for the division.

Property and supplies unit: Procures and maintains the necessary office furniture and supplies for the needs of the division and purchases all printing or special requirements. Is property officer for the division and keeps all necessary records in connection therewith.

The organization and methods section advises on all matters relating to the organization or methods employed in the division. It prepares general reports to other bureaus and to the General Staff, and maintains a general record of construction projects undertaken by the division. Under this section are the following units:

Project unit: Prepares and maintains lists giving the essential information with regard to the various projects of the division in accordance with Supply Circular No. 90 from the office of the Director of Purchase, Storage, and Supply.

Statistical unit: Develops and prepares statistical tables and charts presenting the general facts regarding the work of the Construction Division, such as labor conditions, progress of work, authorizations and allotment of funds.

Forms unit: Studies all forms and suggests changes in their general make-up and combinations with other forms so as to conform to generally approved standards.

Bulletin unit: Issues all office orders and office memoranda for circulation among the officers of the division and maintains proper files and index of same.

The patriotic promotion section combats tendencies to discouragement among the workmen from enemy or socialistic propaganda by mass meetings, pictures, and other forms of publicity. Under this section are the following units:

Speakers' unit: Covers all larger jobs with speakers who, with the assistance of bands, singing, etc., make patriotic appeals and answer questions relative to the war and war conditions. Cooperates with and secures the services of all existing agencies, including those of foreign governments.

Poster unit: Sends posters to jobs bearing appeals of patriotic nature. Makes suggestions to contractors as to pay roll envelope propaganda. Arranges, with cooperation of division of military aeronautics, to "bomb" jobs with fly leaflets intended to stimulate working morale.

Motion-picture unit: To arrange for patriotic and amusement films for showings on jobs where men live in quarters provided on the work.

Newspaper unit: To publish the newspaper "On the Job," a paper designed to stimulate spirit of emulation, good will, and esprit de corps.

The personnel section handles all matters connected with procurement of officers and correspondence connected with applications for commissions; records of officers and enlisted men; appointment, promotion, and leave of absence of civilians on duty under the direction of the Construction Division; direction of travel, changes of station and assignments to duty of such officers, soldiers, and civilian employees; pay, expense accounts and separations from the service of civilian employees; liaison with The Adjutant General's Office and the personnel division of the General Staff. Attached to the office of the officer in charge and in conjunction with the officers' branch is the representative of the Construction Division on the subcommittee of the General Staff on selection of candidates for commission, who handles all specifications for commissioned personnel of the Construction Division. Under this section are the following units:

Office of the officer in charge: Under the direction of the officer in charge; handles all general administrative matters, including passenger transportation, industrial furlough, statistics, miscellaneous correspondence, service and information, mail and mail service, estimates of cost of travel, leaves of absence.

Officers' unit: Handles all matters of files, records, orders, roster, and qualification and rating cards of commissioned officers.

Civilian unit: Handles all matters pertaining to estimates of needs; procurement, transfer, appointment, separation, promotion, expense accounts and orders for travel of all civilian employees in this office and under its direction in the field. Includes all correspondence and full files and records pertaining to such activities.

Finance unit: Handles all matters pertaining to keeping of time, record of leave of absence, pay roll, and pay of all civilian employees of this office in Washington, together with all matters of accounting, financial estimates, disbursements of funds, and full files and records pertaining to such activities.

Enlisted unit: Handles all matters pertaining to the enlisted personnel under the direction of this office, and the induction of persons for service as enlisted men; and, under the direction of the officer in charge of personnel, the care and administration of enlisted men on duty in Washington.

The report section gathers material from constructing quartermasters and prepares all general field reports which go to make up the final permanent records on each project constructed by the Construction Division. Cooperates with the Military Intelligence Section of the General Staff in maintaining proper protection on all operations and handles all confidential investigations. Under this section are the following units:

Reports unit: Publishes The Constructor, a semimonthly publication of the division to keep officers in the field in touch with headquarters in Washington.

Acts as a clearing house for all articles bearing on the work of the division issued through the Committee on Public Information; representative of publicity, Secretary of War, and stories that appear in magazines, technical publications or newspapers. Expedites the censorship of articles and photographs through the Military Intelligence Section. Acts as liaison officer between Construction Division and the Historical Record Section of the War College.

Intelligence unit: Keeps the Military Intelligence Section of the General Staff fully informed of the inauguration, progress, and status of all projects under construction in order that protection and surveillance may be afforded by plant protection section. Acts as liaison with Military Intelligence Section in re investigations carried on by them for the Construction Division.

Investigation unit: Makes special investigations in the field leading to preparation of reports required by other divisions of the War Department.

The survey section surveys and studies all construction projects in order to determine their utility after the war and to make recommendations regarding the same to the Secretary of War.

PERSONNEL.

Chief of administrative division, Col. J. H. Alexander.

Executive assistant, Maj. H. F. Mayer.

Assistants to chief of division, Capt. V. L. Lloyd, Lieut. W. C. Lamprechter, Lieut. C. R. Mänzer.

Industrial service section: Officer in charge, Maj. C. F. Gailor.

Labor procurement section: Officer in charge, Maj. H. B. Stafford.

Office service section: Officer in charge, Maj. A. B. Moreland.

Organization and methods section: Officer in charge, Maj. R. E. Bell.

Patriotic promotion section: Officer in charge, Maj. J. B. Thomas.

Personnel section: Officer in charge, Maj. G. H. Thompson.

Report section: Officer in charge, Lieut. Col. Philander Betts.

Survey section: Officer in charge, Capt. C. Van Blarcom.

COMMENTS AND CONCLUSIONS.

LABOR.

The policy of the industrial service section, which was probably the most important section of the administrative division, as it dealt with vital labor problems, was established by the following agreement executed by the Secretary of War and the president of the American Federation of Labor:

WAR DEPARTMENT,

Washington, June 19, 1917.

For the adjustment and control of wages, hours, and conditions of labor in the construction of cantonments, there shall be created an adjustment commission of three persons, appointed by the Secretary of War, one to represent the Army, one the public, and one labor, the last to be nominated by Samuel Gompers, member of the Advisory Commission of the Council of National Defense and president of the American Federation of Labor.

As basic standards with reference to each cantonment, such commission shall use the union scales of wages, hours, and conditions in force on June 1, 1917, in the locality where such cantonment is situated. Consideration shall be given to special circum-

stances, if any, arising after said date which may require particular advances in wages or changes in other standards. Adjustments of wages, hours, or conditions made by such board are to be treated as binding by all parties.

NEWTON D. BAKER.

SAMUEL GOMPERS.

The agreement did not state the attitude of the Government toward the recognition of union labor. To clarify this point a letter was written by Mr. Louis B. Wehle, acting for the Secretary of War, to Mr. Frank Morrison, secretary of the American Federation of Labor, stating that "it must be clearly understood as a basis for any labor adjustment machinery that the Government can not commit itself in any way to the closed shop, and that the conditions in force on June 1, 1917, which are to serve as part of the basic standards, do not include any provisions which have reference to the employment of non-union labor."

Mr. Gompers agreed that this was the understanding.

On July 27 a supplementary agreement was signed by the Secretary of War and Mr. Gompers allowing the extension of the agreement, on order of the Secretary of War, to embrace any other construction work undertaken during the war by the War Department. On August 8 it was extended to aviation fields, on September 4 to warehouses and storage facilities, and on December 28 to all construction work undertaken by the War Department.

In the meantime, August 10, it had been adopted by the Secretary of the Navy for Navy construction work.

The Cantonment Adjustment Commission, later known as the Emergency Construction Wage Commission, was appointed to administer this agreement. Its personnel was Mr. Ernest M. Hopkins, president of Dartmouth College and assistant to the Secretary of War, as chairman, representing the public; Mr. John R. Alpine, second vice president of the American Federation of Labor, representing organized labor; and Col. J. H. Alexander, representing the Army.

Copies of the letters and memoranda in connection with this agreement and a copy of the rules made to govern its procedure will be found annexed, Exhibit No. 5.

This commission has disposed of hundreds of cases without appeal being taken from its decisions, and it is stated that in only five cases was reconsideration of its decisions requested.

As the prevailing union scale of wages, hours, and conditions on construction work was prescribed by the Baker-Gompers agreement, the principal duty of the industrial service section was to ascertain the rate of wages and conditions in the locality of construction projects. This was done at the time the project was authorized and wage schedules made showing the labor classification, the hourly

rate, the overtime provisions, and other pertinent conditions. These schedules did not become effective until approved by the representative of the War Department on the Emergency Construction Wage Commission and by the War Labor Policies Board. The latter Board, under the Department of Labor, was organized by the President, to unify wages, hours, and conditions of labor for all Government activities, but this result had not been accomplished at the date of the armistice.

The Baker-Gompers agreement is based upon local union conditions and wage rates as they existed prior to the beginning of Government work, and after an approved schedule of wages was established for a project, to obtain an increase in rates, or to change conditions, it was necessary for the workers to make new bona fide agreements with the employers of labor, other than the War Department, and to secure the necessary approval of the War Department member of the War Labor Policies Board.

Under this procedure the Government did not bargain with the workers unless they violated their agreements and went on strike. In cases where it is necessary to complete the work, efforts were made to arrange an agreement between the contractor and the workers. If it was impossible to get the men to resume work their places were filled as rapidly as possible; in some cases with enlisted men.

The industrial service section states that it, at one time, dealt with as many as 400,000 workers on Army construction work in the United States. Few serious labor troubles developed before the signing of the armistice, but shortly thereafter, when overtime was eliminated and the standard eight-hour day reinstated, approximately 65,000 men in different parts of the country walked out. Many soon realized the necessity and propriety of this action by the Government and resumed work.

The industrial service section collected labor statistics from nearly all sections of the United States, and its officials quote other Government bureaus as stating that the labor statistics gathered and analyzed by the Construction Division excel any like records in Washington. This data has aided in quickly reaching satisfactory conclusions in many labor problems.

Government relations and dealings with labor became increasingly complex as the war progressed. Fifteen different boards and commissions were organized to deal with labor problems. They are as follows:

- Council of National Defense Labor Committee.
- War Industries Board Labor Committee.
- National War Labor Board.
- War Labor Policies Board.

Shipping Labor Adjustment Board.
Emergency Construction Wage Commission.
National Adjustment Commission.
Harness and Saddlery Adjustment Commission.
Railroad Wage Commission.
Board of Railroad Wage and Working Conditions.
Railroad Board of Adjustment No. 1.
Railroad Board of Adjustment No. 2.
Arsenal and Navy Yard Commission.
United States Board of Mediation and Conciliation.
President's Mediation Commission.

The jurisdiction and functions of these boards will be found in annexed Exhibit No. 8.

With these boards and commissions acting in various capacities confusion in wage matters was unavoidable as each had a different working basis. As an instance the Shipbuilding Labor Adjustment Board was appointed by the President for fixing wages in the shipyards on the basis of the cost of living. They arbitrarily established a base wage rate which was increased from time to time with the cost of living. This method gives one result.

The Emergency Construction Wage Commission fixed wages on the basis of the prevailing union rates. This method gives an entirely different result. In this case the Government is not a party to negotiations, but accepts the existing agreements between employers and the workers in a locality.

If the war had continued it would have been necessary to find a way of directing efficiently the labor forces of the country in order to avoid a national labor crisis.

The War Labor Policies Board had been established by the Secretary of Labor to secure unification of effort and uniformity of conditions throughout the various labor agencies of the Government, and a plan had been worked out by members of the Government labor agencies to establish a general committee on war labor wage adjustment. The principle on which this committee was to have been founded included the establishment of a national labor policy in reference to readjustment of wages to conform to changes in cost of living; the standardization of conditions in the same trades in the same localities as to hours and rates of wages, including pay for overtime, Saturday afternoons, and holidays; and the prevention of subcontractors and firms engaged in nonwar work from disturbing the standards established on Government work.

At the time of the armistice no definite action on this matter had been taken by the Government. The principles on which the plan of the general committee was based are stated in the first section of this report.

PROCUREMENT OF LABOR.

For the first 16 months of the war contractors on Government construction projects for the War and Navy Departments, Shipping Board, manufacturing plants, etc., had endeavored to secure adequate labor forces by advertisement, by the use of private employment agencies, and by any and all methods that promised results. During the construction of the original cantonments some contractors enticed workmen from other cantonments. This led to competitive bidding and unnecessary raising of wages and the offering of concessions and inducements such as excessive overtime and free transportation and lodging. This created such a condition that if a man were discharged from one Government project he could immediately secure employment on another, with free transportation and often at higher wages. This impaired the efficiency of labor as wages advanced and inducements were increased until, at the time of the armistice, according to the opinions gathered by the Board of Review, labor was delivering not more than one-half to two-thirds of its normal output prior to the war.

It was not until August 1, 1918, that a standard plan was inaugurated for dealing with this vital problem. This plan applied only to unskilled labor. A corresponding plan for dealing with skilled labor was being developed.

In this connection the War Labor Policies Board adopted the following resolutions:

(1) All recruiting of industrial labor for public and private work connected with the war shall be conducted through or in accordance with methods authorized by the United States Employment Service. * * *

(2) The full power of the Government shall be exercised through such agency to supply all the labor requirements of war industries and by means of voluntary recruitments to transfer men to such extent as may be necessary from nonwar work to war work.

(3) This program shall be put into effect gradually by first applying it, beginning with July 15, 1918 (postponed by the President to Aug. 1, 1918), to unskilled labor, and thereafter as rapidly as possible to skilled labor. * * *

(4) All Government departments and private employers engaged in war work shall furnish to the United States Employment Service a complete statement of their needs for unskilled labor and make such supplementary reports as may be requested by it. All the Government departments represented on the War Labor Policies Board should assist in every way in securing such information.

(5) An immediate campaign to secure the unskilled labor needed in war work shall be made by the United States Employment Service.

On June 17, 1918, the President issued a proclamation approving the action of the War Labor Policies Board and called for the cooperation of all employers and workers.

The United States Employment Service of the Department of Labor was the machinery used to secure unskilled labor. It had had experience in recruiting labor for moving crops in the West

and for other purposes, and it maintained employment offices throughout the United States. Community labor boards were established under the direction of the director of the public service reserve in each State, each board having jurisdiction over the recruiting and distribution of labor in its locality. State federation, city central, and local labor organizations were consulted and were asked to cooperate.

About this time, August, 1918, the Construction Division needed approximately 300,000 unskilled laborers. The United States Employment Service reported that the common labor supply of the country was exhausted. A study showed that 250,000 men were available in Porto Rico and that more could be obtained from the West Indies if ships could be secured to transport them. The administrative division of the Construction Division thereupon organized a labor procurement section, which secured the exclusive right to this source of labor supply from the Director General of the United States Employment Service. It obtained three ships and the partial use of a fourth and imported the first foreign labor from the island of Nassau by arrangement with the British Embassy, after arrangements had been made with the Bureau of Immigration to suspend temporarily certain laws on account of the emergency.

In this way 3,000 men were secured whose efficiency, as stated by an official of the Construction Division, was considered somewhat better than that of the average negro from the Southern States.

Fifteen thousand men were imported later from Porto Rico. These men were inferior physically and as workmen to the Nassau negroes, and were considered inferior to the average southern negro laborer. The recruiting from both these sources was done by the United States Employment Service, the Nassau negroes being recruited by professional labor scouts from Chicago, who chose men according to physical strength and general health. The Porto Ricans were less carefully selected, particularly at first, and the men were of a very low and inefficient character. Later the class was somewhat improved. Many were small in stature, poorly nourished, and incapable of hard work. They were very susceptible to the influenza epidemic and other transmittible diseases. After the armistice the return of these men to their homes was begun. Positions were found for those of the Porto Ricans who desired to stay in the United States, and 600 were placed at the arsenal at Charleston, W. Va., and 600 with the Bethlehem Steel Co. If the war had continued, it is probable that 100,000 or more Porto Ricans would have been imported. The Nassau negroes have all been repatriated.

Arrangements were made with the Post Office Department to open postal savings banks in all camps where these laborers were used.

The administrative division endeavored to increase efficiency and promote patriotism by diversified propaganda adapted to the character of the community. Patriotic parades and public entertainments were given in localities where the majority of workmen were Italians, while camp meetings with religious songs were used for the negro workmen in the South. Interesting discoveries were made in this work. It was found that different communities required uplift at varying intervals. On the Army base work at Boston meetings were necessary at 22-day intervals, while at Camp Eustis the interval was 14 or 15 days. Morale was highest immediately after these meetings and then gradually declined.

Many methods were tried to increase labor efficiency. At some of the cantonment projects, although it was not possible to keep the unit cost data, the amount of board feet placed daily per man in each section was carefully kept, and the ratings of the gangs posted daily. This created active competition between gangs and sections and proved quite effective. The operation of moving-picture cameras, with or without films, was found stimulating.

The United States Employment Service did not operate long enough under war conditions to prove its efficiency or value. The opinion has been stated that it was not sufficiently free from labor influences to act efficiently. In response to inquiry the Construction Division stated that the service gave it little aid and it had to rely upon its own initiative and to import workmen as needed. An apparent mistake by the Government was its failure to federalize and fully utilize the private employment agencies for recruiting workmen, as the United States Employment Service could not always reach workmen accustomed to deal with these private agencies. England is stated to have discovered the error of ignoring existing employment agencies and organizations and to have wasted time organizing employment bureaus. The United States did not profit much from this experience. Government departments dissipated their own time and energies in trying to get workmen by persuasion, negotiation, and high wages. Failure of the Government to place workmen under control similar to that exercised over manufacturing concerns handicapped the war work. The refusal of Congress to retain the "work or fight" clause in the draft act cost the country dearly. High wages proved a detriment rather than a help to speed. Men working a large amount of overtime at high hourly rates received about double their former wages. Some wanted this overtime sufficiently to strike for it after the armistice. Others earned so much money that they wanted to stop work and spend it. This latter class caused much delay on Government work. They tried to work three or four days a week, including Saturday afternoons and Sundays, at one and one-half or double time, and to idle the rest of the week. This was unfair

to those working full time and caused dissatisfaction. The seven-day week was proven unsatisfactory, as the average daily output of the workmen was greatly diminished after the second or third week. The majority of the constructing quartermasters consulted stated that excessive overtime and Sunday work, though often necessary, proved uneconomical and caused demoralization and lessened efficiency. In this war work there was no choice, as speed, rather than cost or efficiency, was controlling.

The diversity of labor rates on Government projects in different sections of the country was detrimental, as it created a feeling of unrest and caused the workmen to wander from one job to another in search of easier work or higher wages.

It was stated that, due to the foregoing causes, the labor turnover on much work was in excess of that of prewar times.

The following is a tabulation which compares the time and wage data of the 5½-day, or 44-hour week, at straight 8 hours daily, with the 7-day week of 10 hours daily with overtime allowed for all time in excess of 8 hours for 5 days and 4 hours on Saturdays. The rate for overtime varied for different trades, in some localities being time and one-half for both skilled and common labor, and in others double time for skilled labor and time and one-half for common labor. The Government, however, established the policy of not less than time and one-half for any overtime and conformed to higher local union rates when they were found to exist.

Comparison of straight-time week with overtime week.

HOURS.

STRAIGHT TIME.

	Hours.
8 hours for 5 days.....	40
4 hours for Saturday morning.....	4
Total straight time for week.....	44

OVERTIME.

	Hours worked.	Hours allowed at time and a half.	Hours allowed at double time.
2 hours 5 days.....	10	15	20
6 hours Saturday.....	6	9	12
10 hours Sunday.....	10	15	20
	26	39	52
Straight time.....	44	44	44
Total for week.....	70	83	96

WAGES.

AVERAGE LABORER'S WAGE, AT 40 CENTS HOURLY BASE RATE.

Week at straight time (44 hours).....	\$17.60
Week with time and a half for overtime (83 hours).....	33.20

AVERAGE CARPENTER'S WAGE FOR 69 CITIES, AT 70 CENTS HOURLY BASE RATE.

Week at straight time (44 hours).....	\$30.80
Week with double time for overtime (96 hours).....	67.20

SECTION 30.

ACCOUNTING DIVISION.

DUTIES.

The accounting division institutes the fundamental standards and policies of accounting, in which connection it—

Cooperates with and advises the constructing quartermasters regarding proper accounting procedure and routine through correspondence and by the use of traveling accountants.

Aids in the organization of an efficient field accounting force under the constructing quartermaster.

Examines field records and accounts to ascertain if they are kept in accordance with the Government requirements.

Prepares outline classification of cost subdivisions and supervises their maintenance to meet the necessity of showing analysis of the total cost at the end of the job through correspondence and by the use of traveling accountants.

Supervises the adjustment and settlement of outstanding and disputed items and prepares and approves the forms for reports of final settlements.

Aids the constructing quartermasters in obtaining clearance from the United States Treasury Department for any suspension as disbursing officers.

Compiles the pertinent facts relating to each project such as authorization, estimated cost and fee to contractors, and status of allotments and funds and other sources of funds.

OFFICE PROCEDURE.

The office procedure of the accounting division and its sections is as follows:

Chief of accounting division:

In full charge of all activities—

- (a) Policy.
- (b) Organization.
- (c) Commissions.
- (d) Civilian personnel.

Signs—

- (a) Requests for commissions.
- (b) Travel orders.
- (c) For Chief of Construction Division on accounting matters.

Delegates such authority as in his judgment is advisable to subordinates.

Executive officer:

Principal assistant to chief of accounting division with duties as follows:

- (a) Acts for chief in his absence.
- (b) Supervises activities of division.
- (c) Organizes and coordinates departments of division.
- (d) Brings to attention of chief matters requiring his decision.
- (e) Keeps fully informed of progress and methods of all departments of division.

Signs for chief in his absence.

Consulting accountant:

Title is self-explanatory and duties are to—

- (a) Devise plans of routine, procedure, and organization in field and Washington.
- (b) Coordinate accounts for construction funds with accounts as maintained in offices of the Quartermaster General and Treasurer of the United States.
- (c) Draw up and recommend plans of organization to coordinate the different departments of the accounting division.
- (d) Consult on all matters of policy in the division.
- (e) Supervise correspondence relating to payments and procedure.
- (f) Approve all circulars, letters, and other instructions issued by this division.

Settlements of accounts:

The purpose of this section is to effect settlements with creditors of the United States and its functions are to—

- (a) Issue instructions as to procedure in settling accounts with contractors.
- (b) See that all accounts against contractors of the United States in connection with construction work are properly settled.
- (c) Effect settlement with contractors for Government property used by them and in their possession.
- (d) See that claims of the United States against vendors and common carriers are collected.
- (e) Conduct, under supervision of consulting accountant, correspondence with the field relating to accounting matters.
- (f) Assist the supervising constructing quartermasters and constructing quartermasters in matters of accounting when brought to the attention of this division.

Money accounts of disbursing officers:

The functions of this section are to—

- (a) Maintain full and complete accounts for each construction project.
- (b) Maintain controlling accounts for construction funds allotted from appropriations.
- (c) Maintain record of all construction contracts.
- (d) Conduct an administrative audit of accounts of officers disbursing construction funds.
- (e) Record and take measures to clear suspensions of disbursing officers' accounts.

Funds:

The functions of this section are to—

- (a) Maintain record of all credits both contingent and actual assigned to the construction division to be expended.
- (b) Maintain record of all allotments upon approval by proper authorities.
- (c) Maintain controlling accounts to exhibit conditions of credits assigned both actual and contingent.
- (d) Prepare statements and reports relating to construction funds.

Costs:

The functions of this section are to—

- (a) Prepare and issue instructions for developing costs of all construction jobs.
- (b) Prepare classifications of expenditures for all construction jobs.
- (c) Assist and supervise the installation of cost system at jobs where required.
- (d) Examine all cost reports and criticize same.
- (e) Through representation in each section of building division, assist and coordinate the keeping of costs in the field.

Property:

The functions of this section are to—

- (a) Supervise property accounts and the handling of public property in the field.
- (b) Issue the necessary instructions for inaugurating new property accounts, and for the procedures in property accounting in the field.
- (c) Examine all surveys of property on construction work and recommend, with reviewing committee, action to be taken.
- (d) Coordinate the property work of the construction division with that of the, office of the Quartermaster General (now under Director of Finance Division of Purchase, Storage, and Traffic.
- (e) Represent the construction division in following up the work of the committee on standardization of depot accounting.

Traveling accountants:

The functions of this section are to—

- (a) Assign traveling accountants to the field.
- (b) Detail accountants to make special inspections and audits when directed by chief of division.
- (c) Prepare reports of inspections by traveling accountants and submit same to supervising constructing quartermasters.
- (d) Prepare letters to constructing quartermasters for approval by consulting accountant and for signature of supervising constructing quartermasters, giving instructions for improvements in accounting organization and methods.

Field and office personnel, etc.:

The functions of this section are to—

- (a) Supervise and record all matters pertaining to civilian and commissioned officer personnel.
- (b) Maintain record of employees in auditing departments of constructing quartermasters.
- (c) Upon request assist constructing quartermasters in securing field auditors and other employees in auditing departments.
- (d) Issue and record travel orders.
- (e) Act as liaison officer with administrative branch.
- (f) Supervise supply room.
- (g) Interview applicants for employment and commissions and secure applications upon approval of chief of division.

PERSONNEL.

Officer in charge, Col. Charles Neville.

Executive officers, Maj. H. E. Smith, Capt. W. S. Hammons.

Assistant to executive, Capt. O. I. Koke.

Consulting accountant procedure, Mr. E. F. Cassel.

Settlement of accounts, Maj. T. S. Newton.

Money accounts disbursing officers, Mr. H. B. Wilkinson.

Funds, Maj. R. K. Slaughter, Capt. R. E. Dudley.

Costs, Capt. T. J. Moore.

Traveling accountants, Maj. L. G. Kelly.

Field personnel, etc., Capt. G. B. Squires.

COMMENTS AND CONCLUSIONS.

The central organization of the accounting division in Washington during the cantonment work had a personnel of four members. This gives an idea of the extent of decentralization then practiced. In

effect the central office in Washington was only a means of communication between the several division auditors who had charge of the construction projects. When it was understood that the cantonment division would continue and enlarge its operations it was necessary to add to the duties and greatly increase the force of the central office.

A reorganization was started in January, 1918, by revising the Manual for Field Auditors and standardizing the accounting procedure and the records of the cantonment division project. The field auditor was placed under the constructing quartermaster, and accounting instructions were issued by the accounting division at Washington through the supervising constructing quartermasters of the building division.

ACCOUNTING OF FUNDS.

The construction division makes its accounting of funds to the money accounts branch of the Director of Finance. The allotment of funds to the construction division for construction purposes at the different projects is described under "Procurement, expenditure and accountability of funds."

The accounting division of the construction division furnishes general accounting policies and instructions and has traveling inspector accountants to assist the field accounting staffs and report on the general conditions in the field.

The disbursing officer makes a monthly accounting of all funds received and disbursed to the Director of Finance. The accounting division of the construction division has no part in this work, and errors, omissions, and other inaccuracies are handled by the Director of Finance and the constructing quartermaster. In normal times the Director of Finance makes an administrative audit within 60 days of the date of the monthly statement. Due to abnormal conditions incident to the war work more time was required and a final audit by the Treasury Department was not completed for approximately one year.

In December, 1917, the disbursing officers and field auditors of most projects were transferred to new work and camp quartermasters were given charge of the incomplete construction work, unexpended allotment of funds, and the adjustment of the original construction accounts. In most cases they did not have an adequate accounting force.

The contractor in many cases was doing work for both the constructing quartermasters and the camp quartermasters of a project, and separate accounts were necessary. About March 1, 1918, further complications of the accounts occurred when the duties of the camp quartermasters were given to new constructing quartermasters.

The Cantonment Division issued a variety of instructions disposing of records, with the result that they were either shipped to depot

quartermasters or left at the projects or remained in the custody of the constructing quartermasters, and it has been almost impossible to get them together for the use of the accounting division.

The accounting division is under the Quartermaster General and makes administrative audits of disbursing officers' accounts of construction funds. It has a fireproof building in Baltimore in which the construction records of the various projects are being assembled and is making an audit of the construction division cantonment and camp accounts.

ACCOUNTING OF PROPERTY.

In a similar way the disbursing officer accounts for property to the property branch of the Director of Finance without reference to the accounting division of the Construction Division.

It has been ruled that property shortages on a contract must be charged against the contractor's fee until the disbursing officer obtains clearance by a duly authorized and approved survey as provided by Army Regulations. The Quartermaster General's office issues instructions as to property accounts and surveys to the property officer in the field without advice to the accounting division of the Construction Division, and the latter has no authority to recommend approval or disapproval of the surveys on property shortages.

BOARD OF REVIEW OF PROPERTY ACCOUNTABILITY.

As the constructing quartermasters and auditors had been drawn from civil life and were unfamiliar with the routine of War Department accounting, their accounts were sent in for final audit in unauthorized form and were suspended by the Treasury Department as "irregular." For the purpose of clearing the suspended accounts the board of review of property accountability was authorized by an office order of November 22, 1918, to adjust these property affairs. Three officers of the Construction Division were assigned to this duty, as follows: Maj. John G. Stevenson, chairman of the board, representing the Construction Division; Maj. J. B. Blake, engineer division; Maj. Herbert E. Smith, the accounting division.

This board secured available information regarding the various accounts and then had surveying officers appointed. In order to determine whether the Chief of the Construction Division had legal authority to appoint such surveying officers, the question was referred to the Judge Advocate General for decision, who stated, on December 18, 1918, that there was no law or policy known to his office that would bar the Construction Division chief from exercising such authority within the meaning of paragraphs 903 and 912 of the Army Regulations of 1913 as amended by Changes in Army Regulations No. 61, September 24, 1917, for the appointment of surveying officers.

Surveying officers were recommended by the supervising constructing quartermasters of the various sections of the building division and their appointment signed by the adjutant of the Construction Division. To avoid delay and expense in the property survey, the surveying officer was usually selected from a near-by project.

Members of the staff of the constructing quartermaster of the project were not allowed to serve as surveying officer on the project.

Wherever the property loss was large or it seemed advisable, members of the board made personal investigations. The contractors had to account for the property issued to them and to furnish detailed affidavits explaining the loss or disposition of property. The unexpended property included tools, bedding, cooking utensils, house and office furniture, and any property purchased by the Government that was not used in the construction of the project. It was necessary to make a detailed accounting of all property charged to the contractor which was not found in the inventory of the survey.

After reviewing the evidence the surveying officer makes recommendations which are forwarded to the board of review of property accountability. Its recommendation is submitted to the Chief of the Construction Division for approval, and his report is sent for final action to the Director of Finance acting for the Secretary of War. After approval by the Director of Finance the contractor is relieved of accountability for all property except that for which he has not accounted, and the value of such property is deducted from his final estimate.

AUDITS.

The early Government projects were built under emergency conditions and at a speed that made it impracticable to follow the regular Government accounting procedure, as it was not adapted to such condition. After the completion of the construction work it is difficult to meet the requirements for closing the accounts and making the final settlements. It has been stated that if the constructing quartermasters had attempted to handle their work in accordance with all Government regulations instead of by methods adapted to rush work, the cantonments and camps could not have been completed on time. Apparently most of the present difficulties were due to the lack of experienced civilian Government accountants rather than to delinquencies of the constructing quartermasters or contractors.

The suspensions (see "Suspensions," sec. 18) of disbursing officers (constructing quartermasters) for irregularities in the accounts over which they had little control is a very serious matter. It attaches a stigma to an officer's name and injures his personal credit. It is also unjust to these men, many of whom sacrificed paying positions and valuable business connections for patriotic reasons when they

entered the Government service. They often worked under great strain for long hours, at inadequate salaries fixed over 10 years ago, without any of the overtime payments demanded and received by both skilled and unskilled labor. They contributed notably to the successful outcome of the war and should not now be compelled to wait for relief from the Government except in a case where fraud or misconduct is alleged.

The contractors on such work whose accounts were delayed suffered hardships and financial loss.

Every possible means should be taken promptly to secure the final settlement of these accounts and grant relief to the disbursing officers and contractors from bond and liability by special legislation or other means.

Final audits, if they occur, are made long after the work is completed and the field forces scattered, when their evidence is no longer available. The great difficulties which the delay creates are unnecessary and expensive to the Government and others concerned. It seems obvious that all reports and financial statements made by the field forces should go through the Construction Division for audit and final settlement with the contractor.

SECTION 31.

MAINTENANCE AND REPAIR DIVISION.

DUTIES.

The maintenance and repair division obtains the necessary authorizations and institutes the fundamental standards and policies of maintenance, repair, and operation of the utilities of military posts, camps, etc., coming within the jurisdiction of the Construction Division by—

- (a) Selecting officers for operation of utilities at these projects and supervising their work.
- (b) Maintaining and repairing such posts, etc., and operating the utilities, making allotments therefor from the funds for those purposes.
- (c) Consulting with the engineering division so that the data collected from operating experience may be utilized to the best advantage in connection with future work.
- (d) Maintaining such records as are necessary or of historic interest concerning the projects in its charge.

OFFICE PROCEDURE.

The maintenance and repair division of the Construction Division is charged with the operation, maintenance, and repair of utilities at military posts, camps, cantonments, hospitals, and other organiza-

tions coming within the jurisdiction of the War Department. It obtains authorizations, establishes policies and standards, and has charge of the operation and maintenance of water supply, sewerage, drainage, electrical, heating, refrigeration, and fire protection systems, the upkeep and repair of buildings, roads, and other fixed properties at such establishments. It exercises supervision over new construction of minor magnitude, and additions and extensions to existing plants and systems at posts or camps where constructing quartermasters have been withdrawn, due to the reduction of construction work.

The maintenance and repair division selects officers to operate these camp utilities and directs and supervises their work. It makes allotments for maintenance and repair work from funds provided for such purposes. It compiles and supplies to the engineering division operating data that may be useful in planning new work. It cooperates with all departments of the construction division in order to lessen conflicts of ideas and policies and to improve efficiency and compiles records deemed necessary or of historical value.

The maintenance and repair division is divided into eight sections as follows:

Administrative section.—This section acts for the officer in charge of the division in the appointment, promotion, elimination and assignment of officers; and the procurement, assignment and promotion of enlisted personnel.

It assists in planning and supervising the work of the utilities organization as a whole.

It controls and coordinates the work of the other branches of the division, performs certain routine functions not readily susceptible of delegation to other sections; keeps a record of commissioned and civilian personnel assigned to the division, and cooperates with the administrative division as to personnel, policies and procedures.

Personnel section.—This section keeps record of all officers on duty for the maintenance and repair division and civilian employees whenever necessary in connection with operation and repair work.

Water and sewers section.—This section supervises the construction, operation, maintenance and repair of water distribution systems, water filtration plants, sewerage systems, sewage treatment and disposal plants, crematories, incinerators and odorless excavators; and pumping plants in conjunction with the light, heat and power section.

It passes upon and approves water contracts and installs and maintains plumbing in buildings.

Light, heat, power, and refrigeration section.—This section supervises the operation and maintenance of electric service. The work includes analysis and approval of contracts for electric energy;

construction, operation, maintenance and repair of power plants, heating, refrigeration, pumping and electric lighting systems, lighting fixtures and purchase of light and heat; incandescent lamps; saw-mills and sawmill equipment; supply parts; construction and repair of central and individual heating plants; and inspection of boilers.

Building repair section.—This section supervises the location, construction, repair and extension of buildings for the shelter of officers and enlisted men, animals and stores for military activities and for administrative purposes.

It handles the construction of fences, the installation and repair in buildings of elevators, laundry and post bakery buildings, and, in general, all means taken by the Government to house men and animals and to store supplies.

Service section.—This section has general supervision of all matters coming before the division. All mail first goes through this section which, without further reference, handles all matters not requiring technical investigation and decision.

It scrutinizes requests for authorizations to purchase supplies of various kinds in order to avoid errors in stating allotments, or the account to be charged, and acts on all requisitions and matters pertaining thereto.

It also tabulates the annual repairs to buildings, systems, etc., at military posts and stations, requisitions for heavy furniture for officers' quarters, portable refrigerators, wall lockers, purchase of building materials for the Philippine Islands and Hawaiian Islands, feed boxes, moving-picture outfits and rental of films, and handles tent floor construction, window screening, screening of buildings, storm doors, window shades, etc.

Statistical section.—This is the accounting, statistical and historical record section. A complete record of the purposes for which money has been expended from any allotment and daily balances of the unexpended money are kept of each appropriation. Monthly reports from camps, cantonments, etc., are filed in this section and all statistical records referring to the work of the entire division. It is custodian of the historical record of the construction of each camp, cantonment, post, etc.

Other matters handled by this section are the transferring of abandoned lands, the preparation and keeping of records of licenses, permits, occupation of lands for other uses than military, rights of way, and disposal of surplus water. It administers grazing and cultivation areas, etc.; the demolition of certain buildings on permanent posts; executive orders for withdrawing lands for military purposes; forest areas; sale of timber; permits to cut timber, etc.

Roads and fire protection section.—This section supervises the construction and repair of roads, walks, wharves, sea walls, retaining

walls, and drainage systems, directs dredging operations, care and improvement of grounds, and the purchase and repair of time and fire-alarm systems, fire fighting apparatus, shooting galleries and ranges.

PERSONNEL.

Officer in charge, Col. C. D. Hartman.

Assistant to officer in charge, Lieut. Col. Geo. A. Johnson.

Administrative section: In charge, Mr. F. B. Hunt.

Personnel section: Officer in charge, Maj. H. C. Fernau.

Water and sewer section: Officer in charge, Capt. Chas. D. Weirbach.

Light, heat, power and refrigeration section: Officer in charge, Capt. Harry B. Joyce.

Building section: Officer in charge, Capt. S. T. De La Mater.

Service Section: Officer in charge, Maj. Irving C. Brower.

Statistical section: Officer in charge, Maj. E. E. Whiting.

Roads: Officer in charge, Maj. J. H. Phillips.

Fire protection section: Officer in charge, Capt. C. T. Bissell.

The total commissioned and enlisted personnel of the maintenance and repair division on November 11, 1918, was reported as follows:

	Actual strength.	Authorized strength.
OFFICERS.		
Colonel.....	1	1
Lieutenant colonel.....	1	1
Majors.....	25	44
Captains.....	117	129
First lieutenants.....	146	285
Second lieutenants.....	237	98
Total.....	527	558
ENLISTED MEN.		
Quartermaster sergeants senior grade.....	33	152
Quartermaster sergeants.....	39	374
Sergeants first class.....	522	1,507
Sergeants.....	2,358	7,840
Corporals.....	784	2,394
Cooks.....	82	620
Privates first class.....	1,659	12,828
Privates.....	7,488	3,553
Total.....	12,965	29,268

COMMENTS AND CONCLUSIONS.

On January 1, 1919, the division had charge of the roads, buildings, and public utilities in 46 cantonments and camps, 51 hospitals, 66 border stations, 25 supply depots and terminals, and 171 regular military posts; a total of 359 military establishments. On its work depends the health of the Army and communities adjacent to Army camps. Its allotment of funds for the fiscal year 1919 was \$62,400,000.

The preceding section on the Construction Division of the Army gives the early history of the maintenance and repair division, then called the maintenance and repair branch.

In May, 1918, the maintenance and repair division was enlarged in the Washington office and in the field. The Washington office was divided into more sections, each with an officer in charge reporting to the chief of the division, and the camp utilities organizations were strengthened by the addition of specialists in the management of utilities.

After reorganization, systematic records of work in the field were begun so that comparisons of the cost and efficiency of the operation and maintenance work on various projects could be made.

To supervise the camp utilities intelligently, the Washington office has to have full reports of the needs of the camps and other projects, especially as the utilities officer looks to the Washington office for prompt assistance in authorizing funds for repair and extension and for advice as to policy and operation.

Two methods are used for acquiring data of the projects:

- (1) By reports of inspectors sent to investigate at the projects.
- (2) By reports of the utilities officers.

As the utilities officer is busily engaged if he administers properly the duties of his office, the Washington office requires only routine reports.

The utilities officer from each camp reports monthly upon each section of the camp utilities. The reports are reviewed as to work accomplished and the accumulated data analyzed as to efficiency and economy of operation. The various section chiefs of the maintenance and repair division note comments to the reports before passing them on to the officer in charge of the division. After review the utilities officer is advised as to suggestions and is given instructions prepared with the aid of the memoranda attached by the section chiefs. By this process of analysis and comparison substantial improvement in methods and results has been effected in the operation of the various utilities.

It became necessary to increase the personnel for operating utilities at the various projects much beyond that used by the construction and repair division of the Quartermaster Corps before the war. The camps grew so much in number and size that it became difficult to maintain a proper personnel, and constant requests for additional men were made to the Chief of Staff by the maintenance and repair branch. On July 2, 1918, The Adjutant General issued orders to the various camp commanders reorganizing the Quartermaster Corps' activities in cantonments and camps. Under this reorganization the camp quartermaster, under the Quartermaster Corps, had charge of supply, conservation, and reclamation, and the Construction Division handled the operation and maintenance of utilities. The enlisted personnel of the Quartermaster Corps who were employed in the operation and maintenance of utilities

were placed under the Construction Division, and the camp quartermaster, acting for the Construction Division, directed the operation and maintenance of utilities, and the officer in charge of utilities reported to him.

On August 6, 1918, under General Order No. 72, the utilities officer became a staff officer of the camp commander. He was appointed by the officer in charge of the Construction Division from officers assigned to the Construction Division for that purpose. He assumed the duties previously performed by post or camp quartermasters and such other duties as the camp commander might assign to him, including all duties not specifically assigned to the subdepot quartermaster.

The duties of the camp quartermaster were assigned to a subdepot quartermaster, who was made assistant to the depot quartermaster of the general supply depot. The subdepot quartermaster's duties were "to receive, care for, and issue the Quartermaster Corps supplies, pay troops, make such other disbursements as may be necessary, issue bills of lading and transportation requests, and to have charge of the reservation and reclamation service at the camp."

The utilities were operated entirely by enlisted men. The plan varied somewhat for the National Army, National Guard, and embarkation camps. On August 12, 1918, charts were issued showing the organizations at the different camps. The corresponding personnel is given in the following table, showing that the greatest number was needed at camps where the barracks buildings were heated by steam.

	Officers.	Enlisted men.	Total.
National Army cantonments:			
With central steam heating plants.....	12	715	727
Without central steam heating plants.....	11	409	420
National Guard camps: Without central steam heating plants.....	11	293	304
Embarkation camps: Without central steam heating plants.....	11	544	555

The commissioned personnel for the foregoing organizations was practically the same for each, except that one captain was added at each cantonment having a central heating plant and placed in charge of the heating section, and consisted of—

Major (utilities officer).....	1
Captains (section chiefs).....	2
First lieutenants (executive officers).....	4
Second lieutenants (in charge of service orders).....	4
Total.....	11

The enlisted personnel for the National Army cantonments without central heating was typical also of the camps. It included noncommissioned officers who were supply, exchange, or mess

sergeants, or mechanics, such as master electricians, building foremen, plumbers, and stationary engineers, and privates who were carpenter helpers, plumber helpers, ice handlers, firemen, room orderlies, pipe fitters, fire department reserves, etc., and consisted of—

Quartermaster sergeants, senior grade.....	2
Quartermaster sergeants.....	2
Sergeants, first class.....	19
Sergeants.....	168
Corporals.....	30
Cooks.....	12
Privates, first class.....	110
Privates.....	66
Total.....	409

The Board of Review finds the organization, personnel, and operating performance of the maintenance and repair division to be efficient and that its record of results accomplished renders expedient a considerable enlargement of its activities.

SECTION 32.

FIELD ORGANIZATION.

MANUAL FOR CONSTRUCTING QUARTERMASTERS.

The Manual for the Guidance of Constructing Quartermasters and Field Auditors has become a large volume. It is divided into a number of sections, designated by letters, which are as follows:

General organization.....	Section A.
Organization of building division.....	Section B.
Commandeer orders.....	Section B C.
Insurance.....	Section B 1.
Accounting:	
General instructions.....	Section D A.
Administration.....	Section D B.
Finance.....	Section D F.
Materials.....	Section D M.
Property accountability.....	Section D P.
Commissary.....	Section D S.
Traffic.....	Section D T.
Tools and equipment.....	Section D TE.
Labor.....	Section D TK.
Questions and rulings.....	Section D Q.
Classification of expenditures.....	Section D X.
Charts and forms.....	
Procurement.....	Section E.
Fire prevention.....	Section F.
Employment.....	Section G.
Project completion report.....	Section H.
Miscellaneous:	
(a) Contract for emergency work.	
(b) Contract for supervising engineering service.	
(c) Construction property account.	

Much of the general organization section consists of an explanation of the organization at Washington. The accounting sections were prepared by the accounting division for the guidance of field auditors. They give detailed and comprehensive instructions as to organization needed for the field staff and its duties; also regulations for accounting of funds and property. As their titles show, the other sections have to do with control, management, and supervising of projects.

In order to avoid loss of time from delays in shipment or transportation, the constructing quartermaster was authorized to purchase emergency materials from local stock. The material bought from local stock was limited to 10 per cent of the total requirements. Such purchases were discouraged, as they almost invariably caused criticism, because the costs were higher than those secured through Government purchase.

The purchasing done by the procurement division in Washington was not like that of ordinary commercial business. Under the terms of the standard contract for emergency work the contractor was to buy all material. For this reason procurement in Washington consisted of allotting the material, fixing the price, and forwarding instructions to the contractor in the field to purchase the material at prices and from parties designated by the Washington office.

CHECKING OF MATERIALS FOR QUANTITY AND QUALITY.

On the project was maintained a materials department, in charge of the field auditor under the supervision of the chief materials clerk. The principal duties of this department were grouped under four subdivisions, as follows:

Purchase order branch, in charge of order clerk. Duties—checking prices and recording orders.

Receiving and stores branch, in charge of chief receiving clerk. Duties—checking quantities received and supervising stores.

Inspection branch, in charge of chief inspector. Duties—inspecting quality.

Invoice branch, in charge of invoice clerk. Duties—recording and checking invoices and maintaining statistical records of expendable materials.

The manual directed the contractor not to duplicate the functions of checking the quantity and quality of materials, equipment, etc., received. Ordinarily, Government inspectors checked quantity and quality of materials received.

Question has arisen as to which department should handle the checking and inspecting of material. Decision between the constructing quartermaster and the field auditor is not important as the inspection had to be made by experts and it seems of little moment in which office the inspection was placed. However, as it is clearly

the duty of the auditor to handle invoices, check extensions and compare them with the original orders, it seems logical to give the field auditor all the work. Decision between the contractor and Government forces for handling such work is more difficult. The contractors contend that as they purchase the material, and are responsible for shortages, checking by a third party, the Government, greatly delays and increases the difficulty of settlement with the vendors. However, as the Government system requires that all material be checked and certified by Government agents, the foregoing procedure would require a duplication of forces and increase expense. The board is therefore of the opinion that the checking of material for quantity and quality is rightly placed in charge of the field auditor.

TIME KEEPING.

The method of employment, rate of wages, classification of employees, time keeping, and checking is described in detail in the manual. The field auditor is instructed to furnish to the chief time-keeper a copy of the schedule of wages approved by the constructing quartermaster and it is the duty of the chief time inspector to see that the approved schedule of wages is maintained.

As to whether the time keeping should be done by the contractor and wholly or partially checked by Government forces, or whether the time keeping should be done entirely by the Government forces is a much disputed question. Both systems have been used successfully in the work of the Construction Division. Where the contractor had sufficient clerical forces and was experienced in handling large numbers of men, he succeeded. In other cases it was necessary for the field auditor to take over the actual time keeping and making of pay rolls. The question apparently is largely one of personality and experience. Some of the contractors contend that this function rightly belongs to them as they are directly responsible to the workmen for mistakes and adjustments of wages. However, as, in the foregoing case, the auditor is responsible for the correctness of the time and pay rolls, he would have to largely duplicate the work of the contractor in order to properly check the time keeping in the field and the making of pay rolls.

The board is of the opinion that, in general, the time should be kept and the pay rolls made by the field auditor and that he should supervise the payments in the field.

TYPICAL ORGANIZATION.

The constructing quartermaster, appointed by the Chief of the Construction Division, was usually an Army officer of a rank not lower than major. He was the executive manager on each project

and was responsible for speed, economy, and financial accountability. Under him were the following:

- (1) Field auditor in charge of accounts, materials, rentals, time keeping, and commissary.
 - (2) Supervising engineer in charge of water, sewers, roads, building, plumbing, heating, and electric work.
 - (3) Staff assistant constructing officer in charge of procurement, property accountability, fire, police, and sanitation.
 - (4) Office manager in charge of stenographic work, clerical work, and files.
-

SECTION 33.

CONTRACTORS' ORGANIZATIONS.

The organizations used by contractors on later projects were often more complicated than those used on the original cantonments and camps. They varied in detail according to the construction methods adopted by different contractors, but the general organization features were similar. A typical organization plan, that for the Brooklyn Army supply base, was as follows:

The field organization was headed by an executive manager under whom were—

1. Construction office, divided into six sections.
2. Accounting department, divided into seven sections.
3. Purchasing department, divided into four sections.
4. Subcontract work, divided into six sections.
5. Buildings, streets, and underground, divided into ten sections.

CONTRACTORS' INVESTMENT.

The Government officials who drafted the emergency contract realized that many of the large undertakings would be of a size requiring capital in excess of the resources of many desirable contractors. In order to avoid delays arising from this cause it was thought necessary to aid the contractors by arranging for their use of Government funds. This was difficult because Government regulations require a proper accounting of money expended before reimbursement. The only feasible way to accomplish the desired end was for the Government to make prompt payment of money due the contractor, particularly of pay-roll accounts. The laws for payment of workers are not uniform in the various States. In some States weekly payments in cash are required. Some contractors' pay rolls totaled \$500,000 per week.

Cases arose during the early construction work where, due to misunderstanding or lack of cooperation between contractors and constructing quartermasters or field auditors, the contractor's funds

were so tied up in the work that he was practically bankrupt. The plan of payment provided for advancing 80 per cent of his pay roll prior to his making final supporting proof. This so far alleviated the contractor's needs that nearly all of the contractors interviewed on this subject informed the board that they considered the arrangement to be equitable.

The difficulties above mentioned arose, in large measure, because few projects have been comparable in size and cost with the war construction work and contractors had but little precedent available for organizing their construction forces and small experience in operating under the accounting requirements of the Treasury Department.

SECTION 34.

CONTRACTORS' EQUIPMENT.

In the standard Contract for Emergency Work, article 2, paragraph C provides that the

rental actually paid by the contractor, at rates not to exceed those mentioned in schedule of rental rates hereto attached, for construction plant in sound and workable condition, such as pumps, derricks, concrete mixers, * * * and such other equipment as may be necessary for the proper and economical prosecution of the work.

is to be included in the cost of the work.

The procedure defined by the contract was: as construction plant, or parts thereof, arrived at the site, the contractor was required to file with the constructing officer a schedule setting forth the fair value, at that time, of each part of such construction plant, such valuation being deemed final unless the constructing officer took exception to the price named within five days after the machine was set up and working. An important specification of this rental arrangement was as follows:

When and if the total rental paid to the contractor for any such part shall equal the valuation thereof no further rental therefor shall be paid to the contractor and title thereto shall vest in the United States. At the completion of the work the constructing officer may, at his option, purchase for the United States any part of such construction plant then owned by the contractor by paying to the contractor the difference between the valuation of such part or parts and the total rentals thereof paid therefor.

As it became evident that, under these terms the Government would acquire a large amount of construction plant, a Government equipment and materials section of the building division of the Construction Division was organized, given charge of the transfer and disposal of Government owned material, equipment, tools, etc., and authorized to decide as to the exercising of options on such plant.

This section kept records of plant on the various projects in order to arrange for its utilization or disposal.

By definition, any machine or equipment handled by one man was classified as a tool and that operated by more than one man or driven by animal or other power was classified as equipment. The value of the Government-owned plant in the latter part of November, 1918, was about \$3,500,000. This included locomotives, locomotive cranes, wagons, concrete mixers, power saws, steam shovels, road rollers, etc.

A rough estimate of the plant acquired on work done by the Construction Division shows that it amounted to about one-fifth of that owned by the contractors. This estimate excludes floating plant but little of which was acquired by the Government.

In renting plant the contractor was instructed to incorporate in his contract the same rental provisions as those in his own contract, with a purchase option running to the constructing officer who was instructed not to exercise it unless the Government had acquired a large equity and the plant would be serviceable. This arrangement, which was very beneficial to the Government, might have been administered to the injury of a contractor as, with equipment as difficult and expensive to secure as it was in the war period, it was impossible for him to secure a high enough valuation to protect himself against the Government's taking over his equipment, which would have ended his business.

Equipment acquired by the Government was, in some cases, sold back to the contractor from whom it was originally taken on terms advantageous to the Government.

Following the suspension of work on numerous projects after the armistice, released Government-owned equipment was substituted, wherever possible, for rented equipment on uncompleted projects.

Most of the Government owned equipment has been concentrated at projects still under construction and the rest placed under the control of the maintenance and repair branch of the Construction Division for Army post maintenance work. It is expected that but little construction equipment will be left for sale.

SECTION 35.

COSTS.

It is difficult to obtain accurate cost figures of work done during the early days of the war when cost accounting was subordinated to speed and accomplishment. Some projects were so unique and varied that classifications giving costs in a manner permitting comparisons between different projects were not possible. Unit costs in many

instances often differed because of conditions varying from day to day.

The feeling that the inauguration of detailed cost and accounting systems would cause delay, the shortage of experienced accountants and the absence of accepted standards for such work delayed the adoption of unit cost accounting for some time after the commencement of work.

For these reasons cost comparisons can not be made except between certain unit items, such, for instance, as lumber in place. The total cost of cantonments are not comparable because of individual differences in site, topography, transportation, labor conditions, material costs, etc.

Projects built after 1917 usually differed in character and cost much more than the original cantonments and camps. The effect of these increasing differences was found, on investigation, to offset the advantages of the better cost accounting which was later installed.

It is doubtful whether it was practicable or necessary for the Construction Division to determine the details of construction costs except for the purpose of detecting lack of economy in current unit labor costs. Field determination of such costs by experienced constructors offers probably the best means of assuring efficiency in labor expenditures. The trouble with most cost accounting systems is that the data are seldom available until it is too late for their profitable use. A requisite of unit cost systems is uniformity of standards and this condition could hardly be attained until after one or two years of experience in war work.

Cost accounting is of special value in a production business to determine proper selling prices. War Department emergency construction usually required that cost be subordinated to time, as quick results were essential. The cost systems of private concerns are often so uniform that cost differences reflect differences in conditions but without such a uniform classification, properly enforced, cost differences are likely to reflect principally differences in accounting. Standardization is lacking even in much cost accounting practice of concerns doing similar work, and such uniformity as occurs in statements prepared does not relate to unit costs and is due often to the requirements of those who grant credit or financial accommodation. The value of unit costs is often doubtful except to those who prepare them and are entirely familiar with the particular conditions, while to others they are frequently misleading.

On some projects certain unit costs were determined daily. These proved helpful to the constructing officer and contractor in checking labor efficiency. Among these projects were:

Project.	Constructing quartermaster.
Camp Lee.....	} Lieut. Col. E. H. Abadie.
Denver Hospital.....	
Camp Bragg.....	} Lieut. Col. D. H. Sawyer.
Charleston, S. C.....	
Camp Taylor.....	} Col. F. E. Lamphere.
Port Newark.....	
Middletown Aviation Field.....	} Maj. Carlton.
Brooklyn Army supply base.....	} Maj. Cramer.
Boston Army supply base.....	
Norfolk Army supply base.....	} Col. Crocker.
Philadelphia quartermaster terminal.....	
	} Maj. Gow.
	} Col. Butler.
	} Lieut. Col. E. B. Morden.

Because of wide latitude in judgment permissible in segregating costs on construction work, differences result in reported costs on similar work. For instance, both material and labor may be divided into construction plant and into permanent work, and the cost of the construction plant may be carried separately or may be distributed over the work on any basis deemed fair. The allocation of other costs is similarly subject to wide variation.

After consideration of the foregoing facts and making a study of cost returns from many projects, the Board of Review concluded that cost comparisons thereon were inconclusive and that the essential questions for determination were whether, giving due regard to speed requirements, the expenditures were effectively made.

The board spent considerable time endeavoring to analyze some typical items of cost of the original cantonments under war or actual conditions and also under former peace conditions. For this purpose, and because it represented average conditions, on account of its central location, the board selected Camp Zachary Taylor, near Louisville, Ky., and sent lists of materials, typical layout, and plans to a number of contractors in the Middle West, requesting them to submit unit prices for performing the necessary labor under prewar conditions.

These contractors were requested to state the time which they estimated would be required to build the barracks and quarters of this camp under normal conditions and for the least cost, and also their estimate of the increase in cost if the camp had to be completed in four months. The study was confined to barracks and quarters, as this item constituted the largest single item of construction which was little influenced by local conditions such as topography and nature of the ground, and therefore offered the most reliable basis available for making comparisons.

The following statement, in which the prevailing local wage scale of June 1, 1917, has been substituted for the higher wage scales assumed for Chicago, etc., conditions by the contractors consulted, shows the results of this study and the conclusions reached by the Board of Review.

CAMP ZACHARY TAYLOR.

Details of actual labor costs—barracks and quarters only.

		Approximate average rate per hour.	Total labor cost.	Bonus pay- ment for time not worked (included in column 3).
CARPENTERS.				
Total hours worked.....	1,966,546	<i>Cents.</i>		
Bonus hours not worked.....	394,408	50		\$197,204
Total hours paid for.....	2,360,954	50	\$1,180,477	
CARPENTER FOREMEN.				
Total hours worked.....	122,003			
Bonus hours not worked.....	24,296	67		10,278
Total hours paid for.....	146,299	67	98,020	
LABORERS WORKING WITH CARPENTERS.				
Total hours worked.....	655,515			
Bonus hours not worked.....	131,470	30		39,441
Total hours paid for.....	786,985	30	236,095	
Actual labor cost.....			1,514,592	252,923

Bonus payments 16.6 per cent of total labor cost.

(A) Actual labor cost..... \$1,514,592

Contractors' estimated labor cost based on 1915 rates and conditions:

1.....	\$1,129,270
2.....	855,915
3.....	866,446
4.....	992,573
5.....	705,925
6.....	797,181

(B) Average of above 6 estimates if completed in normal time..... \$891,218

Average increase in cost estimated by same contractors, if completed in 4 months,
19.2 per cent..... 171,114

(C) Average of 6 prewar estimates if completed in 4 months..... 1,062,332

(D) Estimated excess due to war conditions and speed (A-C)..... 452,260

Estimated excess due to war conditions and speed in percentage of C..... 43

(E) Estimated excess due to war conditions without allowance for speed (A-B)..... 623,374

Estimated excess due to war conditions without allowance for speed in percentage of B..... 70

Comparison of actual total costs with estimated material and labor costs based on prewar conditions in 1915:

(F) Actual cost of material..... \$3,689,186

(G) Actual cost of labor..... 3,052,447

(H) Total cost..... 6,741,633

Assuming that the estimated percentages of excess cost of labor on barracks and quarters as above mentioned apply to all other labor, and taking the average advances in cost of material over 1915 at 60 per cent, as shown by figures obtained from the procurement division of the Construction Division, then—

(I) Estimated prewar cost of material (F+1.60)..... 2,305,741

(J) Estimated prewar cost of labor due to war conditions and speed (G+1.43).... 2,134,578

(K) Total estimated prewar cost due to war conditions and speed (I+J)..... 4,440,319

Estimated excess due to war conditions and speed (H-I+J)..... 2,301,314

Showing an increase of actual cost over estimated cost for the same work under 1915 conditions if completed in 4 months..... per cent.. 52

(H) Total cost..... 6,741,633

(I) Estimated prewar cost of material (F+1.60)..... 2,305,741

(L) Estimated prewar cost of labor due to war conditions, not making allowance for speed (G+1.70)..... 1,795,557

(M) Total estimated prewar cost due to war conditions without allowance for speed (I+L).... 4,101,298

(L) Estimated excess due to war conditions not allowing for speed (H-I+L)..... 2,640,335

Showing an increase of actual cost as completed in 4 months over estimated cost of same work in 1915 if completed in normal period..... per cent.. 64

SECTION 36.

SETTLEMENT OF CONTRACTS.

VALID CONTRACTS.

Prior to the armistice the War Department had taken steps to standardize the procedure for settling contracts. For this purpose a board of contract adjustment, composed of three members who were commissioned officers recommended by the Director of Purchase, Storage, and Traffic and appointed by the Secretary of War, had been instituted in the Purchase, Storage, and Traffic Division under General Order No. 103 of November 6, 1918. The Judge Advocate General was directed to assign a judge advocate to act as legal advisor of the board, and it was authorized to have a recorder and one or more examiners appointed by the Director of Purchase, Storage, and Traffic, who were to be commissioned officers. The duties of the board as defined in the above general order were as follows:

It shall be the duty of the board to hear and determine all claims, doubts, and disputes, including all questions of performance or nonperformance which may arise under any contract made by the War Department.

The board shall have all powers necessary and incident to the proper performance of its duties, and shall adopt its own method of procedure and rules and regulations for its conduct.

All members of the board, the judge advocate, the recorder, and the examiners were authorized to administer an oath to any witness. The findings of the board were to be final and conclusive, subject only to the review of the Secretary of War.

Claims boards were established in the various bureaus of the War Department. In bureaus having regional offices, districts, or zone claims boards were established at the regional offices, acting under the Washington office. On May 14, 1919, there were 44 of these bureaus district, and zone claims boards.

For the guidance of these bureaus Supply Circular No. 111 was issued on November 9, 1918, by the Purchase, Storage, and Traffic Division. This circular gave the procedure for terminating contracts or purchases for material or supplies. Two methods were provided—whenever a contract had a provision for its termination that was used; whenever a contract did not have a provision for its termination the contractor was requested to suspend work and to supply in detail a statement under oath, giving the following data in so far as applicable to his work:

- (1) Cost of raw materials on hand, including overhead directly applicable.
- (2) Cost of partly finished product on hand.
- (3) Cost of finished product on hand.

- (4) Cost of special facilities provided by the contractor for the performance of the contract; and
- (5) The contractor's commitments to suppliers, subcontractors and others for contributing materials or work.

If the contractor claimed additional compensation for other items he was required to make a detailed statement of the claim without including any prospective profits.

If an agreement on these claims could be reached it was to be embodied in a supplementary contract which should provide that all raw materials, partly finished products, and finished products on hand be credited to or become the property of the United States. The supplementary contract provided that it should not become valid or binding upon the United States until approved by the Board of Contract Review of the supply bureau in charge, and that in case an agreement could not be reached the matter should be referred to the Board of Contract Adjustment.

On January 20, 1919, by War Department Supply Circular No. 26, a War Department claims board was appointed, composed of the Assistant Secretary of War, as president, and six members from various bureaus of the War Department. The duties of this board were—

to supervise and coordinate the work of the various War Department agencies engaged in the settlement of claims resulting from the termination of contracts or other procurement obligations of the Department consequent upon the suspension of hostilities and to authorize and approve such settlements.

The president of the board was authorized to appoint such additional members as were necessary in connection with other procurement bureaus or agencies of the War Department.

This board, as constituted, had the following personnel on May 14, 1919:

President: Hon. Benedict Crowell, the Assistant Secretary of War.

General members:

Maj. Gen. George W. Burr, Director Purchase, Storage and Traffic Division.

Mr. G. H. Dorr, Assistant Director of Munitions.

Brig. Gen. H. M. Lord, Director of Finance.

Col. H. H. Lehman, Assistant Director, Purchase, Storage and Traffic Division
(with Board of Contract Adjustment).

Mr. W. H. Davis, general counsel.

Mr. R. D. Stevens, representing Finance Division.

Special members:

Col. C. A. McKenney, Purchase, Storage and Traffic Division.

Maj. H. L. Goodhart, Air Service.

Maj. H. D. Rawson, Signal Corps and Chemical Warfare Service.

Maj. F. G. Bolles, Engineer Corps and Construction Division.

Mr. Henry T. Hunt, Ordnance Department.

Maj. James R. Frazer, member at large.

Maj. Erskine Bains, recorder.

Maj. Leigh S. Keith, statistician.

The special members sat with the various bureau claims boards with authority to act for the War Department claims board and as liaison officers between the bureau boards and the War Department claims boards.

On March 6, 1919, by Supply Circular No. 19 the Assistant Secretary of War, acting as president of the War Department claims board, directed that—

Under cost plus contracts where work has been reduced by the direction of the department, all proper items of expense to contractors, such, for example, as payments by them to subcontractors, * * * should be vouched as items of cost, and their payment proceeded with as in the case of any other proper item of cost under such contract without awaiting any settlement contract.

Where a contract contains a termination clause which provides for the reduction of production and the method of payment to the contractor for disbursements made and work done in preparing to perform the uncompleted portion of such contract, and the contractor is willing to waive any right to proceed further with production under such contract, it will frequently greatly expedite the making of payments under such contracts for the bureau, upon such waiver by the contractor to give the notification of termination required by the contract and to proceed to make the payments to the contractor by the method and in the manner provided for in the termination clause. * * *

These directions also urged the use of provisions previously made for a partial payment amounting to 75 per cent of the amount ascertained by the department to be due on any claim of the contractor or any item of such claim. It also directed the speedy settlement of subcontracts, and further pointed out that under Supply Circular No. 111, of 1918—

The principal adjustment which is intended to be applied by Supply Circular No. 111 is that in so far as the contractor had properly made expenditures and incurred obligations in performance of his contract, which, because of the suspension had not resulted in a finished product, the adjustment offered by the department should, in general, provide for reimbursement to the contractor of such expenditures properly incurred, with a reasonable remuneration for the use of capital and services of the contractor in that part of his performance under the contract which did not result in finished product.

INVALID CONTRACTS.

On March 2, 1919, a bill was approved by Congress entitled "An act to provide relief in cases of contracts connected with the prosecution of the war, and for other purposes."

Under this law the Secretary of War was—

authorized to adjust, pay, or discharge any agreement expressed or implied upon a fair and equitable basis that has been entered into in good faith during the present emergency and prior to November 12, 1918, by any person or agent acting under his authority, direction, or instruction, or that of the President, with any person, firm, or corporation for the acquisition of land, or the use thereof, * * * or for the production, manufacture, sale, acquisition, or control of equipment, materials, or supplies, or for services or for facilities or other purposes connected with the prosecution of the war, when such agreement has been performed in whole or in part, or

expenditure has been made or obligation incurred upon the faith of the same by any such person, firm, or corporation prior to November 12, 1918, and such agreement has not been executed in the manner prescribed by law. * * *

On March 3, 1919, under General Order No. 33, the War Department claims board was authorized and directed, in the name of the Secretary of War and by his authority, to proceed with the settlement of all such claims as fell within the sections of the above act, and for the expeditious performance of its duties the board was further authorized to make use, as it might find desirable, of the board of contract adjustment or any agencies in the respective bureaus of the War Department.

On March 3, 1919, Supply Circular No. 17 was issued by the Purchase, Storage, and Traffic Division, calling the attention of the various supply bureaus to a resolution of the War Department claims board for their information, action, and guidance, in connection with the administration of the power conferred upon the Secretary of War by virtue of the act of Congress, approved March 2, 1919. Under the procedure set forth in this circular claims were classified as follows:

Class A: Claims based on agreements made by an officer or agent acting under the authority, direction, or instructions of the Secretary of War, and the nature, terms, and conditions of which have been reduced to contract form or are otherwise established by written evidence.

Class B: Claims based on all other agreements covered by the provisions of section (1) of said act.

Claims falling under class A are presented on a special form to the district or local board if any, otherwise to the bureau claims board, which proceeds to examine into and determine the facts as to the nature, terms, and conditions of the alleged document. If it finds that an agreement within the provisions of section 1 of the said act of March 2, 1919, was entered into, i. e., that it was either "(1) an agreement heretofore reduced to contract form; or (2) a purchase order heretofore signed; or (3) a procurement order or notice of award heretofore signed which sets forth all of the terms and conditions of the agreement; or (4) a document which shall be prepared under the supervision of such bureau claims board and shall fully set forth the nature, terms, and conditions of the agreement * * *," it attaches its certificate thereto.

After the claims board has thus determined, established, and certified the claim it is submitted to the claimant, and after his acceptance and approval the board proceeds to make a detailed examination of the claim and recommends a fair and equitable award as a basis for adjustment or payment. Each award must be submitted to the claimant and his acceptance indorsed thereon and must be approved by the bureau claims board and by a member of the War

Department claims board prior to payment. Several awards may be made instead of one if more desirable.

Claims falling under class B are forwarded to the Board of Contract Adjustment, which proceeds in the same manner as the bureau claims board to determine whether the claim is valid.

The Board of Contract Adjustment is empowered in any case where the nature, terms, and conditions of the agreement have been established and certified by it to refer the claim to the appropriate bureau claims board for examination and recommendations for settlement on a fair and equitable basis. In the event that the claimant is unwilling to accept an award recommended by a bureau, district, or zone claims board, he has the right to appeal to the Board of Contract Adjustment.

In all proceedings under the act witnesses may be compelled to attend and testify and produce papers, books, and other documents. The bureau claims boards and the Board of Contract Adjustment are directed to present to the War Department claims board any special cases or classes of cases in which they find that the procedure as above outlined can not adequately or appropriately be employed.

The method of settlement of a claim is as follows: The contractor presents his claim to the appropriate bureau, district, or zone claims board which examines the same to determine whether it is to be treated as:

- (1) A valid contract.
- (2) An invalid contract.
- (3) An oral or implied contract.

If the supporting papers indicate that there was a valid contract (1), the settlement proceeds in one of two ways: .

(a) Under the termination clause in the contract, if one exists.

(b) If there is no termination clause, then as indicated in Supply Circular No. 111. If agreement is reached on this basis payment is made by the proper disbursing officer after review by the Board of Contract Review of the supply bureau affected.

If the board finds that the claim falls under (2) an invalid contract, or (3) an oral or implied contract, it also determines whether the claim belongs to class A or B.

If the board finds that the claim falls in class A it so certifies, and the claimant's agreement is secured. On this basis the board examines and determines the amount of award, and after acceptance and indorsement of the award by the claimant, payment is made by the proper disbursing officer. In the case of a district or zone claims board the claim is forwarded by such board, with all supporting papers and its findings, to the bureau claims board of the department involved for final review and confirmation of the award before payment is authorized.

If the board finds that the claim falls in class B it is forwarded to the Board of Contract Adjustment for its determination as to whether the claim is valid. If the latter board finds the contract to be valid it either determines the amount of award or forwards the claim with its indorsement of validity to the bureau claims board involved for determination and award. If award is made in settlement of an invalid contract it must be indorsed by a member of the War Department claims board before delivery or payment is made. If the claim is determined invalid the Board of Contract Adjustment so notifies the claimant. A bureau claims board may refer any claim which it is unable to pass upon to the War Department claims board for advice. In like manner the Board of Contract Adjustment may refer any case or class of cases to the War Department claims board for consideration and determination of policy. Any claimant refusing to accept the award of the Board of Contract Adjustment may file his claim for final determination with the United States Court of Claims.

CONSTRUCTION DIVISION BUREAU CLAIMS BOARD.

Prior to the establishment of the War Department claims board, and before the machinery had been provided for the settlement of contracts as above outlined, the Construction Division had proceeded with the settlement of contracts for material mobilized in Washington by the procurement division and for material purchased in the field by the contractors at the direction of constructing quartermasters.

On November 16, 1918, or five days after the armistice, Office Order No. 123, which related to the abandonment of projects, was issued. The procedure instituted by this order required that, after the director of operations had issued authority for the abandonment of any project, the order for clearance of the abandonment must be passed by the War Industries Board in a way corresponding to that in which it has previously passed new projects. The section chiefs of the Construction Division made the requests to the War Industries Board for clearance for abandonment. As soon as the clearance was secured the contracts division of the Construction Division notified the contractor by telegraph that it had been determined to abandon the work as provided in the contract and, at the same time, notified the constructing quartermaster of the sending of such telegram and instructed him to close out the work in a way that would best protect the Government interests. He was instructed to settle with all manufacturers and producers for purchases from local stock without payment for the unfilled portions of the purchase, where mutual consent and release could be obtained. The adjustment for material mobilized by the Washington office was made through such office. Its procedure in making these adjustments

was to obtain a signed supplementary agreement and release from the vendor carrying the approval of the Board of Contract Review of the Construction Division.

On December 31, 1918, by Office Order No. 134, this Board of Contract Review was assigned the duty of approving all final settlements of purchases made by the Construction Division, except such as the constructing quartermasters were authorized to and could adjust in the field without claim.

On February 10, 1919, the jurisdiction of the constructing quartermasters and the settlement of claims in the field was extended to include those which could be settled for less than \$500 on any one purchase order. Claims exceeding \$500 were forwarded to the Washington office with recommendations stating the best terms which could be obtained.

On March 7, 1919, Office Memorandum No. 72 authorized this Board of Contract Review to act as the bureau claims board of the Construction Division and as such to pass upon claims based on agreements made by an officer or agent acting under the authority, direction or instruction of the Chief of the Construction Division, of which the nature, terms and conditions had been reduced to contract form or otherwise established by written evidence, in accordance with the act of Congress of March 2, 1919, and as directed by Supply Circular No. 17.

This bureau claims board of the Construction Division submitted, at the request of the Board of Review of Construction, the following statement of its work to June 30, 1919:

Number of claims adjusted from Dec. 11, 1918 to June 30, 1919	3, 486
Total of suspended portions of contracts	\$12, 169, 050. 93
Amount for which these suspensions were settled	605, 391. 38
Saving to the Government	11, 563, 659. 55
Saving to the Government in per cent.	95
Number of claims under adjustment June 30, 1919	13
Number of contracts on which no claims have as yet been filed	11

The work of this bureau claims board is completed except for those of the claims shown above as are still unsettled and those arising under the act of Congress of March 2, 1919, which related to the settlement of informal contracts. The number of the latter can not be definitely determined. There are not expected to be many.

This bureau claims board has also reviewed and passed upon to June 30, 1919, 178 claims, which were handled by constructing quartermasters and settled for \$796,887.99. The suspended portions of these claims amounted to \$1,815,391.92.

SECTION 37.

SALVAGE OF MATERIAL, EQUIPMENT, AND PROJECTS.

By an act of Congress, approved July 9, 1918, the President was authorized to sell, through the head of any executive department and upon such terms as the head of such department should deem expedient, to any person, partnership, corporation, or any department of the Government, or to any foreign State or Government engaged in war against any Government with which the United States is at war, any war supplies, material and equipment and any by-product thereof, and any complete plant or factory acquired since April 6, 1917, including the land upon which the plant or factory was situated.

War Department Bulletin No. 50, dated August 31, 1918, provides that any bureau of the War Department desiring to sell war supplies embraced within the provisions of the above act, and the cost price of which does not exceed \$5,000, should secure the approval of the Director of Purchase, Storage and Traffic, except in the Philippine and Hawaiian Departments, where the authority of the department commanders is sufficient. Upon receipt of such approval the supplies may be sold at public auction for cash or to the highest bidder on sealed proposals on due public notice. The proceeds of the sale are to be deposited to the credit of that appropriation out of which was paid the cost to the Government of the property thus sold.

Purchase, Storage and Traffic Division Supply Circular No. 117, issued November 21, 1918, after reciting the above-mentioned act and War Department Bulletin No. 50, directed each supply bureau to maintain complete lists and descriptions of all war supplies, material, equipment, buildings, plants, factories, and lands embraced within the provisions of the foregoing act, together with statements as to the location of same, the uses to which they are being applied, from time to time, and the amount paid therefor. Any supplies, material, equipment, etc., embraced within the provisions of the foregoing act, the cost of which is less than \$5,000, could be sold in the manner above described without the approval of the Director of Purchase, Storage and Traffic.

Any bureaus desiring to sell war supplies, equipment, etc., the cost price of which exceeded \$5,000, were required to submit the proposed sale for the approval of the Director of Purchase, Storage and Traffic and to submit a full report to him upon the conclusion of the sale. Only property acquired on or since April 6, 1917, could be disposed of in this way. Each supply bureau was directed to maintain a division of its office charged with the duty of carrying out these provisions.

The Assistant Secretary of War, on November 15, 1918, approved the recommendation made by the Construction Division, through

and with the approval of the director of operations, that the Chief of the Construction Division be vested with authority to direct the sale of supplies or property acquired during the present emergency up to the cost price of \$5,000 at public or private sale, at auction, or after taking bids. Accordingly, the chief notified the constructing quartermasters of the Construction Division, through a circular issued December 2, 1918, respecting the sale of specific building materials and supplies therein enumerated.

The method and procedure devised by the Construction Division for carrying out this order required that, before being sold, all property, regardless of the method of sale, be appraised by a board of three appraisers appointed by the constructing quartermaster to determine the "fair market value," a fee of \$5 per day being allowed each appraiser. Officers or civil employees of the Government were eligible to serve on these boards, but without fee.

Property which would not sell for at least 90 per cent of the "fair market value" as determined above was not to be sold but to be placed in storage. Constructing quartermasters were instructed to submit a report of all construction material, equipment, tools, supplies, etc., which it was in the Government's interest to sell.

The authority of the Chief of the Construction Division was extended later to the sale of property the total invoice cost of which did not exceed \$100,000, and instructions were issued on December 9, 1918, to constructing quartermasters urging them to report all salable property coming within this limit of cost.

Under this arrangement, after securing the authority of the Chief of the Construction Division, a constructing quartermaster could sell at public auction or to the highest bidder, on sealed proposals, after due public notice and in such market as the public interests required, property acquired during the war emergency the cost of which was more than \$5,000 and less than \$100,000.

No property costing more than \$5,000 could be sold at private sale without the authorization of the Director of Purchase, Storage and Traffic.

Office Memorandum No. 46, dated December 13, 1918, appointed a board of sales with a personnel of six officers of the Construction Division, having the following duties:

- (a) Review inventory reports of salable material, tools, equipment, and other surplus property, instructing disposition and method of sale, covering such articles as it determines shall be sold. If private sales are authorized, price limitation shall be fixed.
- (b) Entertain proposals made for salable property, authorizing acceptance if proper, directing other disposition of property, or fixing other prices at which the property may be sold.

Office Memorandum No. 48, dated December 17, 1918, established a material and equipment disposal unit in the procurement division

having charge of the disposal of material and equipment on hand, whether through sales, storage, transfer, or otherwise. This unit was to act under the instructions of the board of sales.

Supervising constructing quartermasters, utilities officers and constructing quartermasters were directed to confer with the material and equipment disposal unit before purchasing material and equipment to learn whether it was available from the Government's stock.

Designing engineers were instructed to consult with the material and equipment disposal unit and to utilize Government stock material wherever possible.

On December 23, 1918, the authority of the board of sales and of the material and equipment disposal unit was extended to include the salvaging of the abandoned National Guard tent camps.

The method of salvage at the different camps varies as follows: Sale by public auction; sale of Government-owned improvements as compensation for damages; sale of buildings separately; and moving of buildings to other sites. Camp Cody, Deming, N. Mex., and parts of Camp MacArthur, Waco, Tex., and Camp Bowie, Fort Worth, Tex., were wrecked and the material used for the construction of camps along the Mexican border. This work was done with enlisted men. Camp Las Casas, P. R., was sold at public auction, separate buildings being sold to individuals. Camp Crane, Camp Syracuse, Camp Nichols, and the remaining 13 National Guard camps were sold at public auction on April 15, 1919. While the proceeds of these sales of camps was but a small part of their original cost, the Government avoided liability for a large amount of damages, as the purchaser had to assume all liabilities.

The authority of the board of sales and the material and equipment disposal unit was further extended on January 18, 1919, to cover the disposal of buildings and improvements, in addition to material and equipment at all abandoned camps and projects where the Construction Division of the Army had been or might be ordered to salvage such buildings and improvements.

A director of sales of the War Department was appointed on December 17, 1918, to supervise the selling activities of all of the supply bureaus of the War Department. This action did not abrogate the authority previously granted by the Secretary of War.

Each staff bureau devised its own method of making sales. That employed by the Construction Division is not necessarily used by the other bureaus. This division undertook the sale of material earlier than most of the other bureaus and, at the recommendation of the director of sales, its method has been adopted by some of them. The salient features of this method are:

- (1) Sales are negotiated by constructing quartermasters directly responsible for the property involved at the project.

(2) Before property is sold it must be appraised by a board of three, appointed by the constructing quartermaster. This board may consist of commissioned officers or other Government employees, not responsible for the property, or civilians especially retained and paid for their services.

(3) The cost of Government property which might be sold by the constructing quartermaster without reference to the Chief of the Construction Division was at first fixed at a limit of \$5,000 and later changed to \$25,000.

(4) Sales of property, the cost of which exceeds \$25,000 and is less than \$100,000, are submitted to the board of sales of the Construction Division for approval.

(5) Sales of property, the cost of which exceeds \$100,000, are referred by the board of sales, with its recommendation, to the director of sales for final action.

(6) The constructing quartermaster must not sell any property by negotiation for less than the value fixed by the board of appraisers appointed by him.

(7) Property may be sold for less than its appraised value by sealed proposals if three bona-fide offers have been received, or by auction.

Sales were discontinued on March 7, 1919, at all projects of the Construction Division, as it was decided to concentrate the remaining property at a few points for storage and distribution.

It is expected that when this property is assembled and carefully inventoried the War Department will have determined what property it may require for future needs and the remainder can be sold. The concentration points for the property are located at projects where the Government holds the land in fee.

The director of sales has organized a superior board of sales control, composed of the heads of the boards of sales of the bureaus or corps of the Army, for the purpose of coordinating the sales work.

HOSPITALS.

In the salvage of hospitals constructed by adding improvements to existing buildings, it has often been found that the cost of restoring the premises in manner required by lease is much more than the salvage value of the improvements, and an attempt is being made to have the owners take over these properties at a fair valuation as an offset to damage claims.

PROCEEDS OF SALES.

On June 30, 1919, the board of sales of the Construction Division had consummated 5,178 sales to the amount of \$1,496,995.40.

SECTION 38.

ADMINISTRATIVE EXPENSE OF THE CANTONMENT AND CONSTRUCTION DIVISIONS.

WASHINGTON OFFICE ADMINISTRATION.

The Board of Review obtained from the personnel section of the administrative division the following figures giving estimated total disbursements to employees of the Cantonment and Construction Divisions from June, 1917, to June 30, 1919, inclusive:

Salaries and allowances to all officers, including Washington office and its field representatives.....	\$3, 479, 387
Salaries to civilian employees in Washington office.....	3, 489, 669
Total.....	6, 969, 056

The board also obtained from the requirements section of the building division the following figures giving disbursements on projects built to June 30, 1919, by:

(1) Construction Division.....	\$925, 951, 971
(2) Ordnance department under the supervision of the Construction Division.....	86, 790, 000
(3) Supply division, division of military aeronautics under the supervision of the Construction Division.....	12, 324, 904
(4) Total.....	1, 025, 066, 875
Cost of Washington office administration in percentage of item (1).....	0. 75
Cost of Washington office administration in percentage of item (4).....	. 68

FIELD OFFICE ADMINISTRATION.

The Board of Review obtained from the accounting division the following figures respecting the total costs of the field offices of the constructing quartermasters and contractors on 143 projects covering examples of substantially every kind of work built by the Construction Division and including Army supply bases, arsenals, bag-loading plants, cantonments and camps, flying field, hospitals, housing projects, nitrate plants, ordnance depots, picric acid plants, power stations, proving grounds, shell-loading plants, quartermaster stores and water works:

(1) Total cost of constructing quartermasters' offices, including salaries (exclusive of officers' pay); transportation and expenses; office furniture and fixtures; office supplies and expenses; and operation and maintenance of automobiles.....	\$5, 992, 230. 93
(2) Total expenses of contractors' offices, including salaries; transportation and expenses; office furniture and fixtures; office supplies and expenses; and operation and maintenance of automobiles.....	8, 314, 007. 15
(3) Total cost of field office administration.....	14, 306, 238. 08

(4) Total disbursements on 143 projects.....	\$212, 963, 196. 88
Cost of constructing quartermasters' offices in percentage of total disbursements.....	2. 8
Cost of contractors' offices in percentage of total disbursements..	3. 9
Total cost of field office administration in percentage of total disbursements.....	6. 7

SECTION 39.

GOVERNMENT LIABILITY.

LIABILITY FOR DIRECT DAMAGE TO REAL PROPERTY.

Government liability incurred at emergency projects was due principally to land damage claims. In most cases the property, is held by lease. Under the terms of these leases, the damage to crops, which occurred when the Government first occupied the property, was usually agreed upon and added to the first year's rental. The leases, however, call for the restoration of the property to the same condition as when taken over by the Government. To accomplish this it will be necessary for the Government to make further expenditures.

In the case of cantonments it has been proposed that the Government acquire the property and use it for future training and other purposes.

LIABILITY FOR INDIRECT DAMAGE TO REAL PROPERTY.

A class of liability claims for damages to real estate adjacent to the Government projects is arising from depreciation of value due to the kind of structures built by the Government. None of these claims has as yet reached the stage of negotiation.

LIABILITY FOR DAMAGE TO ADJACENT REAL PROPERTY.

A class of liability claims arises from damage done to property adjacent to Government property by artillery or rifle fire. Congress has passed several small appropriations in the supply bills to take care of such cases, but up to the present time the amount is insufficient to cover damages claimed and probably caused.

LIABILITY FOR ACCIDENTS TO INDIVIDUALS.

The Federal workmen's compensation law furnishes protection in the case of personal damages to persons in the direct employ of the Government, or caused by the acts of employees of the Government.

State workmen's compensation or workmen's liability insurance has been provided on all projects and the premiums charged to

the cost of the work. These furnish protection in the case of injury to persons in the employ of, or due to the acts of employees of contractors.

In the case of particularly hazardous projects, such as explosive plants, ordnance magazines, bag loading plants, etc., where the liability insurance companies refuse to insure the workmen because of special hazard, such men have been made direct employees of the Government and so covered by the Federal workmen's compensation law. This relieved the contractor from the taking out of accident insurance.

Damage claims arising from personal injuries or injuries to real or personal property from explosion, such as that which occurred at the shell loading plant at Morgan, N. J., will presumably be met by special acts of Congress similar to that providing for the victims of such explosion.

SECTION 40.

QUESTIONNAIRES.

The Board of Review issued on November 1, 1918, a questionnaire in the form of a "Memorandum of Desired Information." A copy of this, together with the entries made thereon for the Norfolk Army supply base, Norfolk, Va., is annexed hereto as Exhibit No. 6. This questionnaire comprised 9 pages of questions to be answered by the constructing quartermaster and contractor of a project.

The object of this inquiry was to secure pertinent and parallel data on each of the important construction projects of the War Department; to obtain a complete statement, in concise form, of its history, character, location, purpose and cost; and to show the local organizations of the Government and the contractor. A form was attached calling for a statement of the rates of wages at the commencement of the project and for changes in these rates during construction.

This information has been received from a large number of the projects built by or under the supervision of the Construction Division of the Army and also from most of the projects built by or for the Signal Corps and the Division of Military Aeronautics formed therefrom and are in the files of the board. They are believed to be of value as a record of the emergency war work and to constitute a more concise and complete description of many important projects than it would be possible at a later date to create.

PART IV.

SECTION 41.

EMERGENCY CONSTRUCTION DONE BY, UNDER, OR FOR THE VARIOUS BUREAUS OF THE WAR DEPARTMENT.

In the first part of the war many War Department bureaus used their own construction organizations for building necessary housing, storage plants, training and transportation facilities.

The Ordnance Department reports that to June 30, 1918, its procurement division had expended \$325,000,000, and its production division \$420,000,000; that these amounts included construction work on 230 factories for developing manufacturing facilities; and that the foregoing did not include \$25,000,000 expended for its supply division by the Construction Division, nor the construction expenditures on nitrate plants by its nitrate division, nor its construction expenditures on proving grounds, arsenals, armories, gas plants, and ordnance depots. Most of these Government expenditures on manufacturing facilities were made by contractors for the supplying of war materials and were in addition to the cost of such materials. A list of the projects which called for these construction expenditures will be found in the annexed Exhibit No. 1.

The Signal Corps, prior to the entry of the United States into the war, had organized a construction division which had constructed a number of flying and testing fields, aeronautical schools, storage and other facilities.

After the order of the Secretary of War, issued October 5, 1917, directing that all construction work rendered necessary by the emergency should be done by the Construction Division, it gradually took over such work for all the War Department bureaus.

ORDNANCE DEPARTMENT.

A large amount of construction had been undertaken prior to the order of October 5, 1917, under the direction of the plant facilities section of the production division of the Ordnance Department. This construction consisted largely of extensions to existing plants of manufacturers with whom the Government was contracting for munitions or war materials, and was included in these contracts as plant facilities. Usually payments for this construction were made

on presentation of vouchers covering labor and material, an upset price being fixed based upon the estimated cost of the work. This construction was usually let by the manufacturer to a building contractor on a cost-plus 10 per cent basis. It is evident from reading these contracts that the attention of the Ordnance Department was so focused upon the one object of obtaining war materials at the earliest possible time that the matter of the cost of increased facilities was treated as an incident, and the fact that the Government would have a large investment in such increased facilities was not considered of great importance.

The form of Contract for Emergency Work, with its diminishing scale of fees, as drawn by the committee on emergency construction of the General Munitions Board, was, for reasons unknown to the Board of Review, not adopted by the Ordnance Department. Much of its construction work was done under straight cost-plus fixed percentage contracts, which carried much larger percentages than those paid by the Construction Division or by the Signal Corps under the standard Contract for Emergency Work.

In compliance with the orders of the Secretary of War of October 5, 1917, respecting the execution of building construction work, it was arranged that the general designs of the Ordnance Department for certain work then pending for ordnance depots be checked up, details prepared and supervision undertaken by the then Cantonment Division. Conferences were held between the Chief of Ordnance, the officers of the supply division of the Ordnance Department, and the officers of the then Cantonment Division in order to determine the best means of carrying out the construction of several ordnance storage depots. Work was promptly started on four such projects in the latter part of October, 1917, and was shortly increased by the addition of much work of similar character. Numerous Ordnance officers were detailed to the Cantonment Division and additional Ordnance officers were later detailed to the Construction Division and served with and under these divisions.

Within a few months the construction program of the supply division, Ordnance Department, developed so rapidly that it was necessary to detail additional Ordnance officers to act as supervising and constructing officers.

To care for the enlarged scope of the work of the supply division, and for the work for other divisions of the Ordnance Department, it was later found advisable to assign a general Ordnance representative to the Construction Division.

Under date of February 23, 1918, Maj. B. B. Lathbury, who had been supervising constructing officer for the projects of the supply division of the Ordnance Department, was appointed to serve as

Ordnance representative. The chief functions delegated to the office of the Ordnance representative included:

- (a) Transmittal of the Ordnance authorizations to the Construction Division with the general requirements of the division originating the work.
- (b) Issuing instructions to the Construction Division for the preparation of preliminary plans and estimates.
- (c) Procuring clearance of the projects through the War Industries Board.
- (d) Procuring requisitions and securing the necessary approval of the Secretary of War, through the office of the Chief of Staff, Director of Operations, for the project and for the expenditure of funds.
- (e) Arranging transfer of funds from the credit of the Ordnance Department to the credit of the Construction Division.
- (f) Issuing authorizations within the Construction Division of approved projects.
- (g) Allotment of funds to disbursing officer on each project.
- (h) Technical supervision through the supervising constructing officers.
- (i) Field inspection and reports on progress.
- (j) Such other general and specific duties of centralized representation as concern the constructing program of the Ordnance Department.

The chemical warfare section of the Ordnance Department was later separated and made an independent unit, known as the Chemical Warfare Service. Its needs for plant facilities construction were handled by the Construction Division.

The general character of the construction projects which the Construction Division handled in part or in whole for the Ordnance Department during the period ending June 30, 1919, is indicated by the following condensed list of projects, contracts for 11 of which, amounting to \$86,790,000, were supervised only by the Construction Division:

Character of projects.	Number of projects.	Approximate expenditure to June 30, 1919.
Acid plants.....	3	\$565,950
Arms, shell, and ammunition plants.....	8	4,832,050
Arsenals.....	12	21,831,800
Depots (storage).....	12	23,423,660
Gas plants.....	1	325,600
Gun plants.....	1	34,500
Housing, barracks, and schools.....	6	1,013,160
Loading plants.....	3	16,910,900
Manufacturing plant extensions.....	6	2,095,000
Nitrate plants.....	3	75,000,000
Powder and explosive plants.....	8	147,990,900
Proving grounds.....	9	24,700,000
Total.....	72	318,723,520

A list of the projects built by or under the Construction Division for the Ordnance Department and their approximate cost up to June 30, 1919, will be found in the list of projects of the Construction Division in annexed Exhibit No. 1.

ENGINEER CORPS.

In compliance with the order of the Secretary of War of October 5, 1917, that War Department construction in the United States be executed by the Cantonment Division, it was arranged that this division construct the camps for the Engineer Corps regiments and Engineer Corps officers and that the Engineer Corps would handle overseas construction. The construction work which the Cantonment or Construction Division handled in whole or in part for the Engineer Corps consisted of Engineer training camps as follows:

Project.	Location.	Approximate expenditure to June 30, 1919.
Camp Glenburne.....	Glenburne, Md.....	\$125
Camp Humphreys.....	Aceotink, Va.....	13, 140, 000
Camp Laurel.....	Laurel, Md.....	7, 000
Total.....		13, 147, 125

The Board of Review did not inspect or visit overseas army construction, as its time was fully occupied with the review of construction work in the United States. It has endeavored to inform itself respecting the character, scope, methods, and results of such overseas work by study of the 1918 Report of the Chief of Engineers, United States Army, of information furnished by him respecting the work and training of the Army Engineer officer and other data supplied by the Engineer Corps. A digest of the information thus obtained is given in the following memoranda, which state the board's understanding of the duties, functions, and work of the Engineer Corps. These are supplemented by an expression of such conclusions and views as seem to be pertinent and warranted.

The Engineer regiments employed in overseas war work comprise combatant and noncombatant troops. The former are used at the front, in the theater of operations, and for work under fire; the latter are not expected to work under fire and are engaged in construction and operation in supply and transportation services.

The commissioned officers of the combatant Engineer troops are engineers. The noncommissioned officers are selected from a military point of view and their ability to control men in action.

The commissioned officers of the noncombatant Engineer troops are also engineers, but of less military training. The noncommissioned officers are selected from a knowledge of the work they have done in civil life and ranked in accordance with their relative positions in those civil offices, such as superintendents and train dispatchers in a railway operating regiment, and similarly with the noncommissioned officers of the shop regiments.

The combatant Engineer officers are expected to be men of pre-eminent ability and training in purely military engineering work and able to do all the ordinary Army engineering work at the front. In France, in the first or combat zone, they had to organize lines of offense and defense, construct and repair roads, bridges, and railroad lines, and bring up men, materials, and supplies. This work calls for special knowledge, resourcefulness, and ability to decide and act quickly. In the second zone, which extended back from the combat zone to and included the ports and terminals, they had to construct and conceal protective shelters, build water and electricity supply lines, etc. In this work the commissioned officers acted, in effect, as executives, managers, and superintendents, and the noncommissioned officers as foremen. Some of this engineering work was done by non-combatant Engineer troops in the Service of Supply.

These noncombatant duties require commanding officers having a sound and thorough training in the methods and procedure of practical engineering and construction work.

The impressions gained by the Board of Review are: That West Point training seems to succeed in implanting discipline, duty, and self-control, which are a good foundation upon which to base later training in practical lines. That civilian technical colleges, with a different character of training, also succeed in laying a good, though not identical, foundation. That the Military Academy graduate seldom has an opportunity to serve a subsequent apprenticeship in creative, practical engineering and in actual construction work under competitive commercial conditions equal to that usually given to civilian technical graduates. That the past practice of allotting some of the Government peace-time civil engineering and construction work to officers of the Engineer Corps in order to give them experience in practical work does not seem to result successfully as to the training of such engineers nor economically for the Government.

That the builders, engineers and architects from civil life had to execute so much of the Government war construction and demonstrated so thoroughly their capacity to handle such work as to make it seem logical for them to do the civil construction of the Government in time of peace. That such a plan would offer every opportunity to train Military Academy graduates by detailing or assigning them to work in competition with civilians where they could acquire needed experience. That the War Department could, by so utilizing such opportunities, train its engineers and qualify them for better leadership in military engineering work.

The foregoing remarks are prompted by the question frequently raised as to whether it would have been better to have placed the Engineer Corps, instead of the Construction Division, in charge of the construction work of the War Department in the United States.

The Board of Review is of the opinion that the correctness of the decision to place this work with the Construction Division and to have it act under the Secretary of War and cooperate with the War Industries Board has been proven by the successful results of such method, particularly in obtaining the speed essential to meeting Army needs.

MOTOR TRANSPORT CORPS.

All construction work for the Motor Transport Corps was done by the Construction Division. The work consisted of mechanical repair shops and barrack buildings. Inspection was made of one of these repair shops at Camp Holabird, near Baltimore, Md. The plant was used for assembling, repairing, rebuilding, boxing and shipping overseas Army motor transport equipment.

The shops are situated on a tract of 122 acres owned by the Government and comprise a main repair shop, a building 500 feet square; two "parts" storage buildings, 720 feet long by 136 feet wide; and a crating shop, 368 feet long by 363 feet wide. These buildings are of steel and concrete construction, of approved industrial type, well lighted and equipped and fireproof.

The frame buildings comprise a one-storage building, 140 feet by 544 feet; a lumber shed; ninety-six 66-men barrack buildings; 23 mess halls; lavatories and shower baths. They accommodate 6,500 officers and men. The additional construction includes concrete roads, cement sidewalks, electric lights, sewage and water systems.

The electric power for the machine shop is generated from a 1,000 horsepower steam plant. Additional power and electricity for lighting is purchased from the Consolidated Gas & Electric Co. of Baltimore.

The projects built for the Motor Transport Corps by the Construction Division are as follows:

Project.	Location.	Approximate expenditure to June 30, 1919.
Camp Holabird.....	Baltimore, Md.....	\$5,330,000
Camp Jessup.....	Atlanta, Ga.....	1,265,000
Camp Normoyle.....	San Antonio, Tex.....	1,779,000
Barracks.....	Philadelphia, Pa.....	20,600
Total.....		8,394,600

MEDICAL CORPS.

The construction of the Army hospitals had always been done by the Quartermaster Corps. It was therefore logical, when the Cantonment Division was formed and base hospitals were required at the cantonments and camps, that their construction should become part of the cantonment work.

Hospitals were built at the debarkation cantonments for the reception and examination of sick and wounded from overseas. For extended treatment patients are subsequently transferred to suitable general hospitals.

After the cantonments and camps were completed general hospitals were built for the reception of sick and wounded men returning from overseas.

The great number of men inducted into service and the heavy casualty lists of American troops indicated by September, 1918, that existing hospital accommodations would be inadequate if the war should continue. To reduce expense and save material and labor, of both of which there was a shortage, it was decided to purchase or lease buildings which could be converted, with reasonably small alterations, into hospitals.

BASE HOSPITALS.

The designs of base hospitals were made in the office of the Surgeon General, and in July, 1917, the plans were delivered to the Cantonment Division. These plans consisted of typical drawings—scale one-eighth inch to a foot—showing the general layout, but without the details of mechanical equipment, such as plumbing, heating, and electric lighting.

The base hospitals were located generally in the most favorable site, usually the highest ground in the camp. One-story frame buildings were used. A 1,000-bed hospital of 56 buildings included single wards, double wards, quarters for officers and nurses, lavatories, operating pavilion, general mess and kitchen, barracks for enlisted men, storehouses, mortuary, chapel, laundry, garage, and other buildings. The typical layout showed a symmetrical arrangement of these buildings, with the principal ones usually connected by inclosed passageways. Base hospitals with 30,508 beds were built at the National Army cantonments and with 21,846 beds at the National Guard camps.

GENERAL HOSPITALS.

The first general hospital, known as General Hospital No. 1, is located at Williamsbridge, New York City. It consisted at first of a group of knockdown frame buildings with a capacity for approximately 500 patients and had been constructed by Columbia University with the expectation of reassembling the buildings in France. These buildings were taken over by the War Department and frame buildings of a more permanent type were added.

In November, 1917, a design for a complete group of standard buildings was developed. These standards, modified from time to time as experience dictated, were followed in subsequent construc-

tion. The early buildings were one-story wood construction, with compo-board lining, and had connecting passageways. Later two-story buildings of similar material were built. A subsequent development was the use of plaster-board lining, with exterior surfaces of metal lath and cement stucco on wood studding. Still later many one and two story buildings were constructed with hollow tile exterior walls, generally with stuccoed exterior surface.

The latest standard plan consisted of a utility and special room head house, oriented east and west as nearly as topography would permit and having parallel ward pavilions extending at right angles from the south side of the head house. The ends of these pavilions were connected by service corridors. One side of each pavilion had an open porch for patients. Usually the administration, surgical, laboratory, and recreation buildings were placed on the north side of the above group, and the quarters for nurses, enlisted personnel, and officers were located north of these buildings. This type of hospital provided a total of 19,123 beds.

LEASED HOSPITALS.

For the selection of suitable buildings which could be leased and turned into general hospitals the country was, in 1918, divided into districts approximating the existing draft districts, and the Secretary of War authorized two commissions to select and purchase or lease and alter suitable buildings. The plan was to place wounded soldiers as near as possible to their respective homes. The commissions had each a representative of the Surgeon General's office, the Construction Division, and the real estate section of Purchase, Storage and Traffic Division. This permitted of making decisions in the field effecting leases and commencing repairs or alterations without delay. A total of 38,500 beds were planned to be provided within a period of six months at a total cost, covering the necessary alterations and rentals for one year, not exceeding \$15,400,000.

At the time of the armistice, when the commissions were ordered to stop leasing buildings, hospitals of this kind having a capacity of approximately 27,000 beds were under construction.

OFFICE PROCEDURE.

The method originally used was for the Surgeon General to make typical plans, which were given to the Construction Division for execution. A section, known as section E of the building division of the Construction Division, was organized to handle the hospital construction for the Medical Corps.

To avoid loss of time by interchange of correspondence and plans between the two bureaus a plan was devised and adopted by which

representatives of the Surgeon General's office who were familiar with the requirements of the Surgeon General and had authority to make necessary changes were placed in the engineering branch of the Construction Division. In this manner the two departments worked together and avoided friction and delays. This is a successful example of cooperation and liaison between departments. It meets satisfactorily most of the criticisms of the results of consolidation of construction under one agency.

Criticism has been made that in constructing cantonments and camps the hospitals were not built until after the arrival of troops in camp. This apparently occurred due to the delay in receiving plans from the Surgeon General's office. The Construction Division states that at some camps hospital construction was begun before the receipt of approved plans from the Surgeon General's office. The lack of hospital facilities during the early months' use of the cantonments is stated to have caused some discomfort and hardship. It seems evident that hospitals should always be constructed in advance of or along with the troop quarters.

A partial list of the construction work handled by the Construction Division for the Medical Corps, showing the number of projects and the approximate expenditures up to June 30, 1919, is as follows:

Character of projects.	Number of projects.	Approximate expenditure to June 30, 1919.
Training camps.....	5	\$158,500
Medical supply depots.....	2	17,500
Base hospitals.....	31	(¹)
General and miscellaneous hospitals.....	51	24,880,230
Debarcation hospitals.....	7	3,582,410
Schools.....	1	5,600
Total.....	97	28,644,240

¹ Included in camps.

NOTE.—The 31 base hospitals were built by the Construction Division from funds allotted to cantonments, camps, and posts.

A list of all hospitals and other projects built for the Medical Corps and the approximate cost of each up to June 30, 1919, will be found in the list of projects of the Construction Division, annexed hereto as Exhibit No. 1.

The following table, which clearly shows the low cost per bed of the leased buildings converted for hospital use, gives the reported bed capacity of Army hospitals in the United States:

TABLE 13.—*Bed capacity of Army hospitals in the United States.*

Character of hospital.	Number of hospitals.	Bed capacity.
Base hospitals:		
National Army cantonments.....	15	32,470
National Guard camps.....	16	24,388
Embarkation.....	7	8,712
Debarcation.....	4	8,873
General.....	47	80,933
Auxiliary.....	1	55
Miscellaneous.....	16	10,991
Quarantine stations (Treasury Department).....	3	2,355
Posts and forts.....	109	8,238
Division of Military Aeronautics.....	48	4,407
Total.....	266	181,422
Leased hospitals abandoned after the armistice.....	12	18,683
Grand total.....	284	200,105

The cost of hospitals as given in the report of section B, building division, is as follows:

	Number of beds.	Cost.	Average cost per bed.
New building projects.....	16,862	\$16,205,787.00	\$961.00
Leased buildings in operation.....	18,487	1,838,869.00	99.00
Total.....	35,349	18,044,156.00	510.45

CHEMICAL WARFARE SERVICE.

In the interests of the work and because of its highly specialized nature, it was found necessary to separate the chemical warfare section from the Ordnance Department and to make it an independent unit of the Army. This plan was carried out about August 18, 1918, under orders of the Secretary of War, and the new bureau was designated the Chemical Warfare Service. As the construction requirements of this service had been handled by the Ordnance representative with the Construction Division, it was decided to continue this representation. This Ordnance representative was also designated as the representative of the Chemical Warfare Service, with duties similar to those he performed for the Ordnance Department. The construction work comprised a number of important projects of which the largest was the Edgewood Arsenal at Edgewood, Md.

The Ordnance Department started construction at Edgewood in December, 1917, and handled it until April, 1918, when the Construction Division was given charge of the new chlorine plant, power station, and hospital cantonment barracks work. On July 2, 1918, the remainder of the work was turned over to the Construction Division. This project comprises a 350-bed hospital, a 20,000-kilowatt power station, a remount station, and cantonment buildings, each housing 150 men. The last are of the new type of barracks as designed by the Ordnance Department, and are exceptionally substan-

tial and elaborate permanent barracks, which are reported to have cost some \$50,000 each, and seem to be unnecessarily expensive for emergency use. The plants have been shut down since the armistice.

Other plants of interest are: Hastings Gas Plant, Hastings, N. Y., and the National Aniline and Chemical plant at Buffalo, N. Y. At each of these plants mustard gas was made in quantity.

The plant built at Willoughby, Ohio, was used for the production of a new gas.

A condensed list of the projects, with the expenditures to June 30, 1919, handled in whole or in part by the Construction Division for the Chemical Warfare Service is as follows:

Character of projects.	Number of projects.	Approximate expenditure to June 30, 1919.
Camps.....	3	\$1,328,600
Experimental station.....	1	380,000
Gas plants.....	4	3,947,750
Manufacturing plant.....	1	190,000
United States gas manufacturing and loading plant (Edgewood Arsenal)....	1	25,000,000
Total.....	10	30,846,350

A full list of these projects and the approximate cost of each up to June 30, 1919, will be found in the list of projects of the Construction Division annexed hereto as Exhibit No. 1.

SIGNAL CORPS.

The Construction Division built four projects for the Signal Corps, the largest of these being Camp Benjamin Franklin at Camp Meade, Md. Inspection was made of this camp. It consists of a regulation cantonment, for the accommodation and training of 11,000 Signal Corps troops, and cost approximately \$3,461,820.

A list of the projects handled by the Construction Division for the Signal Corps, and expenditures to June 30, 1919, is as follows:

Project.	Location.	Approximate expenditure to June 30, 1919.
Camp Benjamin Franklin.....	Admiral, Md.....	(¹)
General supply depot.....	San Antonio, Tex.....	\$3,500
Depot, Fort Wood.....	Bedloe's Island, N. Y.....	380,000
Warehouse.....	San Antonio, Tex.....	3,500
Total (except Camp Benjamin Franklin)....	.....	387,000

¹ Total under Camp Meade.

DIVISION OF MILITARY AERONAUTICS.

The construction division of the Signal Corps, created by Office Order No. 17, on March 21, 1917, undertook the construction of flying fields, warehouses, supply depots, repair depots, balloon schools, and training camps for the Signal Corps, which then handled all aviation activities.

The Signal Corps adopted the standard contract for emergency work created by the General Munitions Board, and used it as drawn or with slight modifications for all its construction work.

Like the Construction Division of the Army, it issued a set of mimeographed instructions for handling its field work, entitled "Instructions to Field Superintendents." It also issued a set of instructions to its field auditors.

Shortly after the Secretary of War issued his Order of October 5, 1917, directing that all construction work rendered necessary by the war emergency be done by the Cantonment Division—later the Construction Division of the Army—it was decided that the construction division of the Signal Corps should complete the projects which it was constructing and that new construction would be done by the Construction Division.

The Air Service, composed of the Division of Military Aeronautics and the Bureau of Aircraft Production, was separated from the Signal Corps by Executive order May 20, 1918. Shortly thereafter the construction division of the Signal Corps became the supply division of the Division of Military Aeronautics. It constructed 48 projects at a total cost, as of May 15, 1919, of \$66,749,339.40.

These projects were somewhat similar to the cantonments and camps, as built by the Construction Division, except that the barracks were one-story construction. The work included the construction of barracks, sewers, water supply and distribution, roads, storage, hospitals, hangars and other buildings.

The building work of the supply division of the Division of Military Aeronautics was completed and the construction organization disbanded prior to the review made of construction work by this Board, which has had but little opportunity to make an adequate study of this work and is, therefore, unable to give an opinion thereon.

The general character of the construction projects which the Construction Division handled in whole or in part for the Division of Military Aeronautics is indicated by the following condensed list, which gives the approximate expenditures to June 30, 1919. On 45 of these projects the Construction Division secured the allotments only for the Division of Military Aeronautics, amounting to \$12,324,904.

Character of project.	Number of projects.	Approximate expenditure to June 30, 1919.
Camps.....	3	\$108,255
Depots.....	12	2,103,975
Flying fields.....	41	10,630,950
Testing fields.....	4	1,405,000
Gas plants.....	2	283,000
Schools.....	9	3,140,650
Miscellaneous barracks.....	3	79,500
Shops.....	1	770,240
Warehouses.....	2	1,205,000
Total.....	77	19,726,570

A full list of projects built by the Construction Division for the Division of Military Aeronautics will be found in the list of projects of the Construction Division contained in annexed Exhibit No. 1.

A list of the projects constructed by the construction division of the Signal Corps, later changed to the supply division of the Division of Military Aeronautics, and their respective costs, as of May 15, 1919, is as follows:

List of projects and expenditures to May 15, 1919, built by supply division of the Division of Military Aeronautics.

Name.	Location.	Cost.
Flying fields:		
Souther.....	Americus, Ga.....	\$1,247,180.66
Carlstrom.....	Arcadia, Fla.....	1,244,526.57
Dorr.....	do.....	1,452,917.87
Scott.....	Belleville, Ill.....	1,755,298.07
Love.....	Dallas, Tex.....	1,278,142.79
Wilbur Wright.....	Dayton, Ohio.....	3,416,914.46
Chandler.....	Essington, Pa.....	8,880.67
Post.....	Fort Sill, Okla.....	1,842,287.00
Taliaferro.....	Fort Worth, Tex.....	1,378,584.00
Barron.....	do.....	1,276,079.26
Carruthers.....	do.....	1,137,213.85
Carruthers (target range).....	do.....	1,832,041.60
Langley.....	Hampton, Va.....	6,744,680.17
Ellington.....	Houston, Tex.....	2,391,437.04
Gerstner.....	Lake Charles, La.....	2,604,377.02
Eberts.....	Lonoke, Ark.....	1,828,256.42
Park.....	Memphis, Tenn.....	2,134,320.04
Hazelhurst.....	Mineola, N. Y.....	5,386,238.52
Taylor.....	Montgomery, Ala.....	1,288,224.47
Selfridge.....	Mount Clemens, Mich.....	2,473,964.53
Chanute.....	Rantoul, Ill.....	1,150,340.24
March.....	Riverside, Calif.....	915,862.08
Mather.....	Sacramento, Calif.....	769,596.01
Kelly, Nos. 1 and 2.....	San Antonio, Tex.....	4,570,705.73
Brooks.....	do.....	1,377,896.57
Rockwell.....	San Diego, Calif.....	1,373,658.60
Rich.....	Waco, Tex.....	1,115,963.45
Payne.....	West Point, Miss.....	1,401,604.92
Call.....	Wichita Falls, Tex.....	1,191,117.36
McCook.....	Dayton, Ohio.....	1,081,733.81
Balloon schools and detachments:		
Observer's School.....	Fort Sill, Okla.....	438,891.75
Florence Field (Balloon School).....	Fort Omaha, Nebr.....	600,673.33
Camp John Wise.....	San Antonio, Tex.....	269,680.23
Acceptance Parks.....	Dayton, Ohio.....	409,895.93
Aviation repair depots:		
Love Field.....	Dallas, Tex.....	756,078.66
Engine and plane repair.....	Indianapolis, Ind.....	651,218.93
Do.....	Montgomery, Ala.....	677,029.29
General supply depots:		
A. G. S. D.....	Americus, Ga.....	448,362.57
Do.....	Fairfield, Ohio.....	900,800.97
Do.....	Los Angeles, Calif.....	8,000.00
Do.....	Middletown, Pa.....	631,699.67
Do.....	Richmond, Va.....	1,023,170.35
Do.....	San Antonio, Tex.....	331,079.49
Concentration camps:		
Camp Dick.....	Dallas, Tex.....	
A. S. D.....	Morrison, Va.....	2,128,771.62
Air Service mechanics schools: A. S. M. S.....	St. Paul, Minn.....	144,444.34
Radio schools.....	Little Silver, N. J.....	597,663.88
Photographic schools.....	Ithaca, N. Y.....	1,869.34
Do.....	Rochester, N. Y.....	59,975.52
		66,749,339.40

NOTE.—Estimated probable final cost, \$69,652,097.09.

SUSPENSIONS.

The Division of Military Aeronautics had the disbursing of its own funds and, therefore, was able to make administrative audits of its accounts. Nevertheless some of its disbursing officers have been

suspended, like the constructing quartermasters on the cantonments and camps. A statement of these suspensions in the Division of Military Aeronautics, as of February 25, 1919, is as follows:

Pay rolls:		Distribution.	
No receipts.....		\$329. 78	
Improper receipts.....		25. 75	
Overpayments.....		80. 65	
			\$436. 18
Material:			
Invoices on which discount not deducted.....	121. 60		
Overpayments—Clerical errors.....	319. 15		
Fee on express.....	77. 94		
Excessive rate of pay.....	1, 036. 34		
Excessive rental on equipment.....	2, 311. 50		
Expense accounts not properly supported.....	934. 21		
Excessive prices.....	50. 00		
Lack of proper information (unit prices, etc.).....	11, 906. 24		
Sundry other suspensions.....	46. 52		
			16, 803. 50
Total.....			17, 239. 68

QUARTERMASTER CORPS.

After the cantonments and camps and Ordnance Department work the largest projects built by the Construction Division were for the Quartermaster Corps, later the Division of Purchase, Storage and Traffic.

Storage and terminal facilities were badly needed for handling the large volume of supplies necessary for the maintenance of the Army in Europe, and at the outbreak of the war the country was greatly lacking in these facilities. Some of these projects, uncompleted at the time of the armistice, are being finished as rapidly as possible, as the storage space and shipping facilities are very necessary.

A condensed list of the projects built for the Quartermaster Corps by the Construction Division and the expenditures to June 30, 1919, is as follows:

Character of projects.	Number of projects.	Approximate expenditure to June 30, 1919.
Camps.....	2	\$6, 725, 000
Army supply bases.....	4	100, 300, 000
Expeditionary depots and warehouses.....	4	5, 406, 300
General depots and warehouses.....	9	8, 780, 350
Interior storage depots and warehouses.....	8	22, 145, 300
Terminals.....	3	40, 250, 000
Building alterations.....	2	42, 000
Total.....	32	183, 648, 950

A full list of the projects built by the Construction Division for the Quartermaster Corps will be found in the list of projects of the Construction Division annexed Exhibit No. 1.

TANK CORPS.

For the Tank Corps the Construction Division built two camps, the expenditure on which to June 30, 1919, was as follows:

Project.	Location.	Approximate expenditure to June 30, 1919.
Camp Colt.....	Gettysburg, Pa.....	\$414,500
Camp Polk.....	Raleigh, N. C.....	905,000
Total.....		1,319,500

EMBARKATION SERVICE.

For the Embarkation Service the Construction Division built the following projects. A condensed list with the expenditure to June 30, 1919, is as follows:

Character of projects.	Number of projects.	Approximate expenditure to June 30, 1919.
Camps.....	5	\$39,150,000
Depots.....	2	795,000
Temporary housing.....	1	(1)
Total.....	8	39,945,000

¹ Included in camps.

A full list of projects built by the Construction Division for the Embarkation Service will be found in the list of projects of the Construction Division annexed as Exhibit No. 1.

GENERAL.

The greatest undertaking, though subdivided into many projects, was the construction, in the summer of 1917, of the cantonments and camps for the Army by the Cantonment Division—later the Construction Division of the Army. These comprised the 16 National Army cantonments, the 16 National Guard camps, a National Guard camp in Porto Rico, detachment guard barracks, a limited-service camp, and a number of camps along the Mexican border. The Construction Division also built other camps and training schools for the Infantry, barracks, hospital facilities or utilities at the Army posts, coast defense and interior, recruit depots, remount depots, war prisons, and many miscellaneous projects, including barracks, roads, water supply and distribution systems, electric power plants, and buildings in Washington and elsewhere.

A condensed list of these projects and expenditure to June 30, 1919, is as follows:

Character of projects.	Number of projects.	Approximate expenditure to June 30, 1919.
Artillery (Field).....	3	\$33,350,000
Artillery (Heavy Coast).....	1	12,160,000
General camps, including cantonments, National Guard camps, camp in Porto Rico, detachment guard camps, limited-service camp, and camps on the Mexican border with utilities.....	98	278,326,530
Infantry camps and schools.....	7	7,163,280
Temporary buildings in Washington.....	3	2,375,000
Meat storage and ice plants—France.....	3	4,064,145
Miscellaneous.....	9	1,043,600
Roads.....	5	2,585,000
Water and electric power projects.....	11	11,059,000
Army posts, coast defense.....	85	12,369,850
Disciplinary barracks.....	3	63,100
Army posts, interior.....	47	14,601,215
Recruit depots.....	4	636,000
Remount depots.....	3	77,800
War prisons (included in permanent Army posts).....	4	.....
Quarantine stations (Treasury Department).....	3	409,500
Total.....	289	380,284,020

The Construction Division also built three quarantine stations, costing \$409,500, for the Public Health Service of the Treasury Department.

A full list of these projects with expenditures to June 30, 1919, will be found in the list of projects of the Construction Division in annexed Exhibit No. 1.

A recapitulation of the projects built by the Cantonment and Construction Divisions for the several corps and bureaus of the War Department follows. This is also a recapitulation of the lists of projects built by the Cantonment and Construction Divisions with approximate estimated cost to June 30, 1919, annexed Exhibit No. 1.

List of projects built by the Cantonment and Construction Divisions of the Army, with expenditures to June 30, 1919.

RECAPITULATION.

Character of projects.	Number of projects.	Approximate expenditure to June 30, 1919.
<i>Artillery.</i>		
Field: Camps.....	3	\$33,350,000
Heavy: Camp.....	1	12,160,000
	4	45,510,000
<i>Camps, General.</i>		
Cantonments.....	16	199,886,200
National Guard.....	16	72,643,400
Limited-service.....	1	280,000
Porto Rico.....	1	2,015,000
Guard detachments.....	8	1,308,670
Mexican border.....	56	2,193,260
	98	278,326,530
<i>Chemical Warfare Service.</i>		
Camps.....	3	1,323,600
Experimental stations.....	1	380,000
Gas plants.....	4	3,947,750
Manufacturing plants.....	1	190,000
Gas manufacturing plants (Edgewood Arsenal).....	5	25,000,000
	14	30,846,350

List of projects built by the Cantonment and Construction Divisions of the Army, with expenditures to June 30, 1919—Continued.

RECAPITULATION—Continued.

Character of projects.	Number of projects.	Approximate expenditure to June 30, 1919.
<i>Embarkation Service.</i>		
Camps.....	3	\$39,150,000
Depots.....	1	795,000
	4	39,945,000
<i>Engineer Corps.</i>		
Camps.....	4	13,147,125
<i>France, construction in.</i>		
Meat storage and ice plants.....	3	4,064,145
<i>Infantry.</i>		
Camps.....	4	1,718,280
Schools.....	3	5,445,000
	7	7,163,280
<i>Medical Corps.</i>		
Camps.....	2	158,500
Depots.....	2	17,500
Hospitals:		
Base.....	31	(1)
Debarkation.....	7	3,582,410
General and miscellaneous.....	51	24,880,230
Schools.....	1	5,600
	94	28,644,240
<i>Military Aeronautics, Division of.</i>		
Camps.....	3	108,255
Depots.....	12	2,103,975
Flying fields.....	41	10,630,950
Testing fields.....	4	1,405,000
Gas plants.....	2	283,000
Schools.....	9	3,140,650
Shops.....	1	770,240
Warehouses.....	2	1,205,000
Miscellaneous.....	3	79,500
	77	19,726,570
<i>Miscellaneous Construction.</i>		
Barracks, Bureau of Standards.....	1	81,000
Temporary Buildings, Washington, D. C.....	3	2,375,000
Various buildings.....	8	962,600
Roads.....	5	2,585,000
Water and power projects.....	11	11,059,000
	28	17,062,600
<i>Motor Transport Corps.</i>		
Camps.....	4	8,394,600
<i>Ordnance Department.</i>		
Acid plants.....	3	565,950
Arms, shell, and ammunition plants.....	8	4,832,050
Arsenals.....	12	21,831,800
Storage depots.....	12	23,423,660
Gas plants.....	1	325,600
Gun plants.....	1	34,500
Housing, barracks and schools.....	6	1,013,160
Loading plants.....	3	16,910,900
Manufacturing plant extensions.....	6	2,095,000
Nitrate plants.....	3	75,000,000
Powder and explosive plants.....	8	147,990,900
Proving grounds.....	9	24,700,000
	72	318,723,520

¹ Included in camps.

List of projects built by the Cantonment and Construction Divisions of the Army, with expenditures to June 30, 1919—Continued.

RECAPITULATION—Continued.

Character of projects.	Number of projects.	Approximate expenditure to June 30, 1919.
<i>Posts, Permanent Army.</i>		
Coast defense.....	85	12,369,850
Disciplinary barracks.....	3	63,100
Interior.....	47	14,601,215
	135	27,034,165
Recruit depots.....	4	636,000
Remount depots.....	3	77,800
War prisons.....	4	(¹)
	11	713,800
<i>Quartermaster Corps.</i>		
Camps.....	2	6,725,000
Army supply bases.....	4	100,300,000
Expeditionary depots.....	4	5,406,300
General depots.....	9	8,780,350
Interior storage depots.....	8	22,145,300
Terminals.....	3	40,250,000
Building alterations.....	2	42,000
	32	183,648,950
<i>Signal Corps.</i>		
Camps.....	1	(²)
Depots and warehouses.....	3	387,000
	4	387,000
<i>Tank Corps.</i>		
Camps.....	2	1,319,500
TREASURY DEPARTMENT (PUBLIC HEALTH SERVICE).		
Quarantine stations.....	3	409,500
Total.....	596	1,025,066,875
<i>Projects on which the Construction Division did not handle the funds, doing supervision only.</i>		
Ordnance Department.....	11	86,790,000
Division of Military Aeronautics.....	48	³ 12,324,904
	59	99,114,904
Projects entirely handled by the Construction Division.....	537	925,951,971

¹ Included under posts.² Included under Camp Meade.³ This amount also includes the expenditures made by the Division of Military Aeronautics on 13 projects on which the Construction Division later did construction work.

SECTION 42.

SELECTION OF PROJECT SITES.

The selection of sites for the cantonments and camps was made by boards of officers appointed by the department commanders. Sites for other projects were selected by the respective bureau, corps, or military agency of the Army requiring them, as follows:

The Quartermaster Corps selected the sites for its camps, depots, warehouses, expeditionary depots, interior storage depots, and other

facilities. These were usually located on main railroad transportation lines or at terminals where supplies could be collected and stored ready for shipment to camps or to the overseas expeditionary forces. Later the Department of Purchase, Storage and Traffic selected the sites for Army supply bases and port terminals built along the Atlantic coast.

The Ordnance Department selected the sites for proving grounds, arsenals, bag-loading plants, bomb plants, depots, housing, incendiary products, and some manufacturing plants making munitions, including nitrate plants, sulphuric and picric acid plants, toluol recovery plants, shell making and loading plants, and many others.

The Chemical Warfare Service selected sites for its gas plants and gas-defense work.

The Artillery Corps selected camp sites for the field and heavy artillery.

The Engineer Corps selected sites for its camps and schools.

The Signal Corps selected sites for its warehouses, depots, and camps.

The Tank Corps selected sites for its camps and manufacturing plants.

The Motor Transport Corps selected sites for its repair shops, storage buildings for spare parts, crating shops, training camps, and garages.

The Medical Corps selected sites for general clearing, debarkation, embarkation, and miscellaneous hospitals, Medical Corps camps, and Veterinary Corps camps.

The General Staff selected sites for permanent posts, interior Army recruiting depots, remount depots, and war prison barracks.

The majority of these projects were built on leased ground. The sites of some of the larger projects, such as artillery camps, proving grounds, Army bases, etc., were purchased.

The Ordnance Department selected also the sites for a large number of projects, of which the majority were extensions to existing manufacturing plants, and were, therefore, located either on Government-owned or leased sites adjacent to such plants or on the property of the manufacturer, who was to undertake the operation of the plant on completion. The Government expended several hundred million dollars for manufacturing plants, and installed equipment on ground much of which it does not own or control.

In many such cases the Government now has three alternatives:

To buy the site at the owner's price.

To sell the buildings to the owner at his price.

To remove the buildings from the premises. This procedure in most cases is impracticable, as the cost of demolition and restoring

the site would be as much or more than the salvage, and, in addition, the owner of the land usually finds ground for a claim.

In some cases the manufacturers with whom contracts were placed for construction and production through their control of plants, processes, or patents, or because of other reasons, were the only available sources from which the Government could secure certain essential war materials. However, it is difficult to understand why the officials drawing the contracts under which these plants or extensions were built did not protect the Government's interests by agreement, option, or purchase of sites. The value of the site was usually inconsiderable compared to the expenditure by the Government for the improvements it made or paid for thereon. Had this been done the Government would now be able to sell or lease these properties on terms much more favorable than it can now obtain, being practically without rights and at the mercy of the landowners. The board believes that this situation warrants careful inquiry and the taking of such steps as will, in the future, enable the Government to act promptly in an emergency without having to lose the use or title to its property. This may call for legislation.

SECTION 43.

LAND AND REAL ESTATE.

Prior to the war all matters pertaining to the purchase or rental of real estate were handled by the construction and repair division of the Quartermaster Corps.

On May 20, 1918, the following memorandum was issued by the Secretary of War:

The Office of the Director of Purchase, Storage and Traffic shall have sole charge of carrying out the purchase, lease, rental, condemnation or requisitioning of real estate and buildings for the use of the War Department recommended by the operations division, General Staff, and all such questions shall be referred to it for necessary action after approval.

Pursuant to this order the Purchase, Storage and Traffic Division issued instructions on June 22, 1918, as follows:

The chiefs of the several bureaus, corps, and other agencies of the Military Establishment shall report directly to the purchase and supply branch, Purchase, Storage and Traffic Division, any contemplated requirements for real estate or rentals, at the earliest possible date and in as complete detail as possible. * * *

In those cases where specific property is desired by the several bureaus, corps, and other agencies of the Military Establishment, it is hereby directed that all requests for the purchase, lease, rental, condemnation, or requisition of real estate and building, shall be presented directly to the purchase and supply branch, Purchase, Storage

and Traffic Division, and that such requests shall furnish specifically and in detail the following information:

- (a) Exact location and description of the property wanted.
- (b) The need and necessity for the property.
- (c) When and for how long the property will be required.
- (d) Probable cost; copy of estimates or appraisals, if any.
- (e) Names of owner or owners, or lessor.
- (f) Maps, diagrams, or surveys thereof, showing dimensions.
- (g) Full legal description of the premises, if possible.
- (h) Special conditions, if any, of lease or purchase.
- (i) If purchase is requested, state why lease would not be satisfactory.

Propositions thus reported will be fully considered by the purchase and supply branch, Purchase, Storage and Traffic Division, in conjunction with the operations division of the General Staff, and if approved by the operations division and by the Secretary of War, the Director of Purchase, Storage and Traffic will proceed to acquire, or direct the acquisition of, the property and will supervise or direct all negotiations relating to such transactions, including the preparation of all leases and other papers in connection therewith.

On July 2, 1918, a supply circular was issued by the Purchase, Storage and Traffic Division, directing—

That all bureaus, corps, and other agencies of the Military Establishment transfer to the purchase and supply branch, Purchase, Storage and Traffic Division, all papers and files relating to real estate and rentals transactions. * * *

It is further directed that all bureaus, corps, and other agencies of the Military Establishment transmit to the purchase and supply branch, Purchase, Storage and Traffic Division, the names of all persons, both commissioned and civilian, who have been engaged in the preparation and filing of such papers, to the end that such personnel as may be necessary may be transferred or detailed to that office.

On August 26, 1918, "the supervision and direction of all requirements and the procurement and production activities, including real estate of the several bureaus, corps and other agencies of the War Department" were placed in control of the Purchase, Storage and Traffic Division by General Order No. 80, and on August 27, 1918, the Purchase, Storage and Traffic Division issued supply Circular No. 80, reorganizing itself, and creating among others a facilities department, whose duties were "responsibility for and authority over procurement of real estate."

In the memorandum of the Director of Purchase, Storage and Traffic to the General Staff, dated July 18, 1918, subject: "Reorganization of Army supply system," page 5, it is stated:

The purchase of real estate, and the construction, maintenance and repair of buildings and facilities is thought to be a direct function of storage and supply. Whether this opinion is approved or not the function should be found in one self-contained unit or organization located either in the division of operations or the division of supply.

Although the reorganization as outlined in this memorandum was approved by the General Staff, with the exception that "the portion of the plan which puts construction under Purchase, Storage and

Traffic, is disapproved; construction will remain under operations," the purchase of real estate was separated from construction, and the recommendation as above quoted was not carried out.

The Construction Division states that, in securing their sites, there was a lack of cooperation by the facilities department of the Division of Purchase, Storage and Traffic, and that in a number of cases it has been necessary for the Construction Division to enter upon property and proceed with construction before purchase or rental of the site had been consummated.

The board is strongly of the opinion that, as stated in the memorandum of July 18, 1918, by the Director of Purchase, Storage and Traffic, the construction work and the purchase of real estate should be under one organization unit; that, in time of war, it is very important that land and real estate matters should be handled with the greatest speed and that wherever practicable, proper safeguarding of Government interests requires the taking of a renewable lease or an option to purchase or the purchase, at a reasonable price, of land or other real estate on which Government improvements are placed.

Many other difficult real-estate problems now exist, due to the lack of Government title, option to purchase, or satisfactory lease of land upon which the Government has expended large funds for grading, structures, plants, and plant facilities. The Construction Division states that it always raised this question and either settled the matter itself or received a statement that some other bureau was responsible for its proper handling. Col. Lincoln Bush of its engineering division, states, for the Construction Division, that it has already cleared up all the land-title business for which it was made responsible and is now endeavoring to clear up similar business for which, it is stated, other departments, principally the Ordnance Department, had been responsible.

Problems of disposal or retention of real estate and of the salvage or other disposal of material thereon are now most important. Some of the cantonment and camp sites are of strategic importance for the future military program. It is possible that such property, and other like property, if Government owned and not used, could be leased or otherwise utilized, in time of peace, in ways which would offset some of the carrying costs. In some instances the cost of the real estate is such a small fraction of the expenditures already made and its ownership by the Government is so essential, either to adequate future preparedness or to the proper sale or salvage of the Government improvements, that it was advisable to acquire title. In many cases more than enough could have been saved in salvage of improvements to buy the land and thus avoided the necessity of

selling many modern structures at junk prices because of nonownership of the land by the Government.

The utilization of war plant facilities in peace times might entail Government ownership thereof with private operation either with or without Government participation in the earnings. This plan has serious objections owing to possible politics and patronage abuses. The Government could, however, take title to much of this property and lease it to the highest bidder, possibly keeping some control over the character of improvements made, retaining the right to eject the tenant in time of emergency by paying appropriate damages.

The War Department in emergencies should be authorized to buy land without special legislative authority. Such a provision would have saved much time and money, especially in Ordnance Department expenditures made on land owned by other parties. The Secretary of War might be authorized in emergency to buy necessary land out of funds appropriated for specific projects, as in the case of Army camps. In the case of the railway right of way of the Norfolk Terminal the land was condemned under the pure food law in order to meet emergency conditions.

PART V.

SECTION 44.

PRINCIPAL CONCLUSIONS AND SUGGESTIONS FOR IMPROVEMENTS.

The foregoing sections are chiefly devoted to the presentation and analysis of information and facts ascertained by the Board of Review of Construction respecting the emergency construction program of the War Department and its work completed and in progress.

The following sections state at greater length the principal conclusions and suggestions for improvements which the board has to make. They are followed by a transcript of conclusions copied from preceding sections. A condensed statement of suggestions for improvements, made in the interest of better efficiency in War Department construction, is given in the letter of the board transmitting this report.

SECTION 45.

CONSOLIDATION OF GOVERNMENT CONSTRUCTION.

Soon after war was declared the work of designing and building the cantonments and camps was all placed under the Cantonment Division, especially created for the work and developed into an Army organization functioning along essentially commercial lines, with the right to report direct to the Secretary of War. This was followed by combining all War Department construction under the Construction Division of the Army, which operated in a similar manner. The results so demonstrated the advantages of this plan for executing such construction that the Board of Review has studied the possibility of consolidating the nontechnical construction work of all departments of the Government and here presents its conclusions.

The system of dividing Government construction among a number of departments is at variance with business practice, which usually combines similar activities under one administrative bureau. Concentration of authority need not cause upheavals or delays, as it requires only a gradual combination or transfer of responsibilities, as was proved by the success which followed the placing of all War Department construction under one organization. Had it been

possible to effect this combination earlier, much time, money, and wasteful duplication of effort in Government bureaus and industrial processes would have been saved.

Special fitness, training, and experience in organization, selection of personnel and creation of standards are necessary to the success of a single Government construction bureau. With the interested bureaus it should plan any desired facilities and decide all questions which relate to the location of the several units of a group of buildings, the arrangements of their interiors and the machinery to be placed therein, and other features of importance affecting the later production operations. The work should then be executed by the construction bureau, which must be trained to Government methods and an appreciation of Army and Navy standards and requirements. During the war this was lacking among many civilians in and out of uniform.

It is wrong in principle for each bureau to attempt to do construction, for such subdivision among separate organizations created for different specialized kinds of work precludes the attainment of uniformity and economy in methods and results. It creates delay, duplication, conflict and waste, and allows the more aggressive bureaus to accumulate an excess of facilities at the expense of the others and to the detriment of the general program.

The separate performance of like work by the major departments of the Government means failure to use desirable working methods that are possible only with consolidation. The separate tasks are usually too small for the best men or too large for average men. Such a plan results in expensive procurement and inspection, prevents desirable standardizing of types of units, and makes property accountability difficult. These defects can not be overcome by using, under central supervision, the individual bureau construction organizations, as this would cause divided responsibility, irritating conflicts of authority, and useless duplication of employees and executives. The present methods of handling much Government construction work seem to involve complications of authority, or red tape, and to fail to grant the authority that should accompany responsibility in order to obtain quality, economy, and reasonable speed.

The bureau handling peace-time Government construction must, to be successful, comprise a trained personnel of large and varied experience, who, as well as the work, should be freed, so far as possible, from limitations of military rank or seniority. This requires the liberal utilization of civilian experts to avoid the complications and difficulties inseparable from a military organization. Under such a plan, when the Army is in action in time of war, it could be given control over the execution of its own construction. There

seems little reason for doing this under peace conditions except as to technical military construction.

The war emergency proved that war must be fought by the entire Nation, of which the great majority are civilians, and that the responsibility for executing even Government war construction must be placed with experienced civilian engineers and constructors.

The payment of higher salaries than those of the Army classification is necessary in order to obtain the best expert service. This is impracticable under the present plan, as the cost would be too great because of an excess of partly employed men scattered among a number of bureaus. Consolidation would make it possible to secure the best talent for Government work with a resulting saving in total salaries, and also to obtain more efficient expenditure. Payment of these relatively higher salaries to expert civilians is warranted because of their short term of service and the fact that they would not have the benefit of the life positions of the Army. Such civilians showed their willingness to accept the regular Army scale in war time by their prompt acceptance of call and service with the Construction Division.

To handle properly a large volume of Government construction work, control must be exercised through centralized supervision. This should fix the general standards and policies and be decentralized as to the design and execution of individual projects, so permitting the proper adaptation of general plans to local conditions by those in direct charge of each piece of work.

The War Department alone should not be relied upon and made responsible for the success of the Army in war. In peace times its status is necessarily one of inaction, and such an organization, normally inert, can not of itself expand speedily to the full proportions necessary for meeting all Army needs in a war emergency and assure the country of protection. In time of war, the War Department is expanded under great strain from a relatively small to the largest Government department. At such times other departments, particularly those having to do with internal affairs, are contracted and many of their activities practically suspended. As the Government has to utilize civilians to perform its construction work during war, it is desirable to relieve the War Department from dangerous strain in war by having a peace-time construction organization which, being unhampered by military regulations, could work at maximum efficiency and in war could handle emergency construction speedily and effectively. A sufficient amount and variety of work to keep its personnel well trained would be provided under such a plan without enlarging the normal and proper scope of Federal activities.

Observation indicates that satisfactory results in the war emergency construction have been accomplished largely by, and in

degree proportionate to, the freeing of experienced constructors from control by Army officers. This leads to the conclusion that neither Military Academy training nor Army experience can of itself insure fitness or ability to handle construction work.

Consolidation of all construction bureaus would train up a strong organization which would be effective in time of war but would not lead to undesirable militarization of Government construction in time of peace. Under war conditions the Army could then devote all its energies to military problems and qualified civilians would handle all other work.

A general construction bureau or department charged with the design, construction, maintenance and repair of all Government buildings and structures would work in cooperation with the other departments requiring construction work. This consolidation of construction activities now scattered would enable the Government to estimate, plan and handle such work in a better and more business-like manner than has heretofore been possible and make more reliable estimates of expenditures. If these were based on a centralized system of accounting and auditing of costs and operating expenses the making of appropriations on a budget system would be facilitated and responsibility for both estimates and actual costs would be properly fixed.

Future nonmilitary construction expenditures will aggregate a large percentage of the total annual Government disbursements and will occupy such a prominent place in its economic and industrial life as to necessitate direction by an independent construction organization of appropriate standing and full authority, which should report to a Cabinet officer.

The above mentioned matters have been discussed with experienced contractors, consulting and constructing engineers and members of the national engineering societies and with others both in and out of Government service whose opinions carry weight. Of those last named some were men now or formerly commissioned in various War Department bureaus and others have held Government positions of responsibility. The questions submitted to them were, first, whether Government construction should be consolidated as herein described; and, second, who should have charge of the work if this were done.

The answers to the first question were almost unanimously in favor of consolidation and the opinion was generally expressed that failure to take such action would be a grave mistake.

The answers to the second question varied, but generally agreed that all Government construction should be administered by a civilian organization; that executives of wide business or construction experience would be necessary, and that this specification would

exclude Army officers lacking practical construction experience along commercial lines however well qualified they might be for handling military engineering work.

At a hearing of the Board of Review, held March 5, 1919, J. W. Joyes, colonel, Ordnance Department, United States Army, Chief of the Nitrate Division of the War Department, was asked for an expression of his views respecting the handling of all Government construction by one organization and made the following statement:

In order for the performance of all construction by one body, such as a construction division to handle work for other Government bureaus, to be successful, effective steps must be taken to secure proper coordination between the bureaus doing the construction, the requisitioning and the designing work as well as between the user and the Government.

This is especially true of technical work; such as nitrate plants, powder plants, bag-loading plants, chemical warfare plants, and other technical work. The responsibility for the disposition and arrangement of machinery should lie with the user or tenant organization, or else with the Government bureau making the initial requisition. Construction standards, dimensions, etc., which are not of importance to the construction bureau, should not be arbitrarily fixed by it but, rather, controlled by the wishes of the requisitioning body, whose representative should be accorded every consideration and whose views should be met so far as practicable and not overruled because some happen to be inconsistent with certain existing standards or preconceived ideas of the construction bureau.

In short, the construction bureau and its designers should act as a constructing architect would and use every effort to meet the views of its clients, giving advice freely whenever any dispositions desired by client would entail structural unsoundness, excessive cost, or like defect, on which a construction viewpoint may shed light, but leaving to the client the decision as to whether such disadvantages are offset by the needs of the work to be done or processes to be used in the plant.

This will require a higher order of liaison work than in the past and one which shall be reasonably proof against friction or delays arising from conflicting personalities, each having a measure of authority. Of course with accommodating personalities on both sides matters will naturally work out satisfactorily in any event.

A statement along similar lines appears in a report made October 7, 1918, by M. F. Chase, director, explosives division, War Industries Board, to the Assistant Chief of Staff, giving the results of an investigation which was made at the request of the latter of construction of the Tullytown and Seven Pines bag-loading plants for the Ordnance Department, from which the following is extracted:

It is my opinion that the men identified with this work, as representatives of the various interested parties, are all capable men and are considered so by everybody connected with the job.

I would sum up the situation by stating that the underlying cause of delay in the construction of these two plants was due to the fact that the work was not conducted under the direction of a single responsible head and that a final authority was wanting for settling promptly questions of layout, design, and specification. In view of the fact that the plants as now constructed seem to be extremely well adapted for the purpose for which they were intended, and also that the construction work has generally been well done, if the work had been conducted under the direction of a single

head the other elements in the situation which have added to the delays would not, even if they had existed, been serious.

I am quite confident that the arrangement made as to the relation between the various interested parties in this case if followed in any case involving the building of industrial plants will be entirely inadequate to permit of the greatest possible speed of construction.

The fundamental difficulty is the manner of stating requirements. I am strongly of the opinion that requirements must be either stated in the most general terms and the division responsible for constructing the plant to take care of these requirements should have full and complete authority without being required to obtain the approval or consent of the bureau requesting the building as to the method of procedure, it being understood, of course, that the method of procedure in all cases must be in conformity to the general rules and regulations of all Government agencies having a direct interest in any element of the work, or the requirements must be stated in a most complete form and finished drawings handed over to the division doing the construction work, and the division doing this work should not attempt to criticise or change any drawings or specifications and should proceed on the theory that their work is merely to administer the contract and that the department or bureau asking for the work take the full and complete responsibility comparable to that taken by a designing and supervising engineer.

At a hearing of the Board of Review held December 20, 1918, attended by Thomas A. Gallagher, lieutenant colonel, and Harold Bennington, lieutenant colonel, being, respectively, the executive officer and assistant chief and the chief of the accounting branch, Department of Military Aeronautics, discussion was had of the effect of placing all war emergency construction work with the Construction Division of the Army; also as to the desirability of consolidating all Government construction in peace time. Both officers expressed the opinion that their department, formerly the construction division of the Signal Corps, could have accomplished satisfactory results during the war period if it had continued to handle its own construction work, which consisted principally of flying fields and accessories. The latter officer summarized by stating:

In peace time no corps or bureau should have a separate construction branch. I think, however, it was unwise to make that change when it was made. We had a very efficient construction organization in our organization and were getting results and by having the construction work taken away from us we were obliged to see work done in a way which was not to the advantage of the Government.

The conclusion expressed in the first sentence is of present interest and is shared by the Board of Review. The opinion expressed in the balance of the statement relates to issues not now active and regarding which the board has found differences of opinions to exist.

After full consideration the Board of Review finds that Government construction work for public use should not be done by the War Department and that the execution of some of the construction now assigned by law to that department should be transferred to a civilian construction bureau.

SECTION 46.

CONSOLIDATION OF GOVERNMENT PROCUREMENT.

War Department procurement for construction comprised the purchase, or the acquisition from other bureaus, of material and equipment and their inspection, expediting, and delivery to project sites. Speed, economy, and labor cost were so vitally dependent upon the prompt and orderly delivery of construction supplies needed to keep the labor forces actively employed that satisfactory results could be secured only by the most effective cooperation of the engineering and procurement organizations. By keeping the engineering force in close touch with varying market conditions, it was enabled to make quickly whatever changes were needed in plans and specifications to expedite procurement.

The Division of Purchase, Storage and Traffic recommended that it be given charge of the procurement of construction material. If this plan were adopted, satisfactory speed on construction could not be secured and labor costs would be increased, as the necessary coordination between the designing and the purchasing bureaus would not be possible. Any advantages that might be obtained from the inclusion of construction material in centralized purchasing would be far outweighed by the delays and extra costs entailed, except as to materials purchased for and issued from storage. The claimed advantages of the plan recommended by the Division of Purchase, Storage and Traffic would be retained, without incurring the disadvantages mentioned, by proper cooperation between such division and the purchasing branch of the bureau doing construction work.

In its field inspections the Board of Review saw apparently ample supplies of materials and heard no complaints by contractors as to shortage of supplies.

SECTION 47.

CONSOLIDATION OF GOVERNMENT INSPECTION.

Large technical organizations, expert in testing and inspection, have been organized to meet the demands of private business for proper inspection on construction and production work. By having numerous clients, they are able to supply a high order of inspection service at a low cost. The use of numerous Government inspectors from different departments on the same duties is wasteful and results in lower efficiency and poorer inspection work than could be secured by assigning the responsibility to a single properly organized bureau of experts.

The restrictions placed on Government inspectors, their lack of authority and frequent lack of judgment, increased materially the

cost of work to the Government. Contractors often consider Government work unattractive because of trouble arising from these causes and add to their bids a sum to offset the expenses and delays that these inspections create.

The works manager of a company which supplied shells and cases to Great Britain, France, Russia, and later the United States, expressed the opinion that enemy interests were aided materially by delays caused by unnecessary and unwise rejections by inexperienced United States Ordnance Department inspectors of quantities of nearly finished munitions acceptable to the European Governments; and that these inspectors thus unwittingly rendered great service to the enemy at a time when munitions were badly needed, through their incompetent or overzealous utilization of all possible grounds permitted by the specifications for rejection of articles meeting practical requirements.

The Board of Review finds that the consolidation of Government inspection under one competent and thoroughly experienced bureau is most desirable.

SECTION 48.

OFFICERS' RESERVE CORPS.

The Officers' Reserve Corps was authorized by the national defense act, approved June 3, 1916. War Department General Order No. 321, of July 28, 1916, quotes the pertinent sections of this act and the regulations prescribed by the President to carry it into effect. The corps consists of sections corresponding to the various Army, staff, corps, and departments of the Regular Army. The total personnel was fixed at 50,000, divided in the same proportions as the existing bureaus or corps of the Regular Army.

Commissions in the Officers' Reserve Corps are issued without upper age limit for a period of five years unless sooner terminated in the discretion of the President. A member is not subject to call for service in time of peace, and whenever called for service may not, without his consent, be so called in a lower grade than that held by him in the Reserve Corps. In time of actual or threatened hostilities the President may order its officers to duty with the Army, in which they may be promoted to temporary vacancies with the pay and allowances of such Army grade. Enlisted men, if United States citizens, are eligible for examination for commissions.

The passage and application of this act offered an opportunity for training and service, of which advantage was taken by large numbers of men who received commissions in various corps. As there was no allotment of commissions for a distinct Construction Corps, the Construction Division, which was formed from a branch of the

Quartermaster Corps and has continued to wear the insignia of such corps, first exhausted, for its personnel, the quota of commissions available in the Quartermaster Corps and then, in order to obtain more officers, secured their appointment to other branches of the service and had them transferred to the Quartermaster Corps for duty and service with the Construction Division. In this way men holding commissions in the Quartermaster, Engineer, and Signal Corps and the Ordnance Department were included in the personnel of the Construction Division. After the Engineer Corps had assigned many of its reserve officers to other corps and divisions it requested the transfer to such corps of the men who had been assigned to them, and so created vacancies in its engineer reserve officer quota which it could fill.

The Officers' Reserve Corps proved invaluable as a means of supplying officers to the Army. Many of these men had some military training in addition to their civilian qualifications. The Construction Division of the Army was formed from the constructors and engineers so obtained, who had practical skill and experience in all kinds of designing, building, and construction work.

The Board of Review is of the opinion that the Officers' Reserve Corps members engaged on the emergency construction work of the War Department could have rendered better service if the time available for their training had permitted giving them more instruction in Army organization methods, relations, and discipline, as many civilians, especially the older ones, entering the Army do not seem to grasp the need of conforming to its requirements. There also seems to be considerable room for improvement on the part of the officers of the Reserve Corps and those of the Regular Army, who represent, respectively, the civilian and military branches of engineering, in developing adaptability to the others' viewpoint.

The board finds that the fullest encouragement should be given to the organization and development of the Officers' Reserve Corps in order to furnish military instruction to the constructors and engineers who may be needed for future emergency construction as well as for other work.

SECTION 49.

SUMMARY OF CONCLUSIONS AND SUGGESTIONS FOR IMPROVEMENTS.

Only the more important conclusions and suggestions for improvements are included here. Some repetition and overlap will be found, but as, in a number of cases, the same conclusions and suggestions for improvements are drawn from different sources and subjects it is thought best to quote them as they appear in the respective sections. They have been grouped according to subject with a reference indicating where the statement may be found in the text.

DISHONESTY.

(Section 3, page 26:) The Board of Review found little evidence of dishonesty in War Department construction work. It believes that the greatest losses to the Government were not due to dishonesty, but were caused by the use of inadequate methods and men who were unfit or incompetent for construction tasks put upon them. The giving of important positions to men who were untrained in the work they had to direct was costly and jeopardized the success of the war program. It may have been thought that such men would be less apt to use their positions to overdo their work or to profit by contracts placed with their former associates, overlooking the fact that incompetency of officials invites dishonesty, because of their inferior capacity to direct or stop it. Whatever the reason, vacillation and inaction were assured while such men were learning their tasks. No method more costly or more likely to cripple the work of the Army could be adopted, as the extra costs of a prolonging of the war by delays due to inefficiency of this kind could easily run into hundreds of millions of dollars and thousands of lives.

POLITICAL INFLUENCE.

(Section 3, page 26:) Political influence was not a disturbing factor in war emergency construction work, and there is a good ground for belief that it would not prove detrimental to the peacetime operations of a consolidated construction bureau handling all ordinary Government work.

THE CANTONMENT DIVISION.

(Section 6, page 64:) As to the plan: It would have been impossible for the Government to build the cantonments and camps on time by purchasing materials and employing its own labor forces. Results proved that the Government had all and more than it could do to expand its own staff bureaus to meet war demands without simultaneously attempting to create and operate a large number of construction organizations.

ENGINEERING.

(Section 18, page 143:) The method generally adopted of making only the typical plans in Washington was the only one under which the fieldwork could have been done within the available time. The standards adopted were from the best engineering practice and could be applied to construction work without waste of time or money on nonessential details. In many cases decisions had to be made without precedent. This necessitated knowledge, judgment, and experience. Energy and boldness were shown by the engineers in quickly conceiving the plans and in accomplishing their prompt execution.

CONSTRUCTION.

The placing of competent men in charge of each project and giving them broad general instructions and full authority over the work, the selecting of experienced contractors, and the giving to superintendents and contractors the assistance of expert advisory engineers and town planners was in line with the general policy for emergency construction work approved by the Government.

Many difficulties were met in organizing administration and construction forces of the necessary size. There were no contracting organizations of sufficient size to undertake the work that was planned, and, as those used were organized under the stress of war-time conditions, it was difficult to obtain efficiency. This organizing entailed some lost motion, but, considering the work as a whole, the efficiency was apparently no lower than might reasonably have been expected from the prevailing conditions.

MATERIAL.

The methods adopted for locating and purchasing, or otherwise acquiring, all the needed materials proved effective. The procurement of some of these materials in quantity, through the medium of representatives of groups of manufacturers in Washington, was advantageous from the standpoint of speed. It distributed orders according to the existing facilities for filling them and prevented confusion and congestion in the material markets, which would have delayed deliveries. It is believed that the prices obtained by this substitution of cooperation for competition were as low as could otherwise have been obtained.

QUALITY OF CONSTRUCTION.

The board has studied cantonment plans and specifications and inspected the type and quality of construction used in a number of these projects. Its conclusions thereon are as follows:

All facilities that were important and reasonably warranted were furnished.

The general health, comfort, and convenience, and the physical, mental, and social welfare of the troops were provided for as fully as was practicable.

The barracks were of modern housing type, reasonably well provided with ventilation, window screens, heat, and electric light.

An adequate supply of pure water was furnished for drinking and bathing, with modern plumbing and sewerage systems.

The kitchen, bakery, and steam laundry equipments were first class.

Facilities furnished for reading, recreation, amusement, and comfort included libraries, theaters, and post exchanges.

The civic improvements equaled, in character, those of many suburban cities and included walks, paved roads, street lighting, and fire protection. In some cantonments the buildings were painted. This added to the life and decidedly improved the appearance of the structures.

SPEED OF CONSTRUCTION.

This board shares the generally expressed opinion that the cantonments and camps were built with remarkable speed.

The designs were as economical as the requirements and as due provision for the health and reasonable comfort of the troops permitted.

Delays occurred due to lack of competent workmen and mechanics. Some loss of time was caused by lack of proper supervision of labor. Most of the delays were due to unavoidable causes and emergency conditions, and all were so overcome that the construction was ready as and when needed.

As has elsewhere been pointed out, in reviewing war results obtained and difficulties overcome by the industrial home army or the overseas combatant army, the essential test is believed to be the degree of success achieved and not the size of the organization or of its pay roll. In order to have the necessary workmen for this construction on hand when needed it was impossible to avoid having and paying for a labor surplus when progress was slowed up by lack of materials or other causes. It is reported that the contractor on one of the cantonments stated that he could increase the speed or output 25 per cent if he doubled the working force, and that he was at once instructed to do so. This instance shows how cost, the usual criterion of economy, had to be subordinated to speed in order to complete the cantonment work on time. For these reasons the board believes that, in a review of the cantonment and camp work done in 1917, for the tests of speed, quality, and cost must be substituted speed and quality.

The reported total cost of the 16 National Army cantonments and camps as of December 31, 1918, was somewhat under \$200,000,000 and the average daily cost of the War to the United States was about \$30,000,000. If the completion of these cantonments and camps in time to receive the army in September, 1917 and to house it during the extreme winter of 1917-18 shortened the war by only one week their total cost was saved. If it shortened the war by one or two days the total excess costs paid for speed were saved. These figures include no allowance for any saving of soldiers' lives.

The board is of the opinion that, had construction not been pushed at maximum speed, cold weather would have interfered with and caused much delay in this housing work, which, with the difficulty of training troops in severe winter weather, would have greatly

delayed the mobilization, training, and embarkation of American troops for France, with results that might have seriously influenced the issue of the war.

(Section 10, page 101:) The work of this organization was greatly aided by the good teamwork and spirit of cooperation which was built up within it by its leaders. Special mention is due of the broad vision, knowledge of character, and good judgment shown by these men in the selection and placing of their subordinates.

(Section 11, page 102:) The conclusion of the Board of Review is that the value of the method and results used on cantonment and camp construction can not be measured in dollars or in unit costs but must largely be gaged by the usual test of Army work, success or failure. In this case all evidence obtained indicates that they achieved a degree of success much beyond that anticipated.

HEALTH AND VITAL STATISTICS.

(Section 15, page 138:) With respect to the foregoing, the Board of Review is of the opinion that, while it is impracticable to house the Army in single rooms, the subdivision of the barrack buildings, by three-quarter partitions, into squadrons, containing not more than 15 or 16 men each, could be economically accomplished, allowing each man about 60 square feet of floor space; that the lavatories should be so conveniently located that men could be required to wash their hands before meals; that whenever and wherever practicable, considering fire hazard, sanitation should be promoted by providing toilet facilities so connected to sleeping quarters that they might be used without exposure to weather.

THE CONSTRUCTION DIVISION.

(Section 6, page 64:) The Construction Division of the Army earned the respect and confidence of substantially all of those with and for whom it worked, especially as to its grasp of actual and probable requirements and its speed of execution.

The plan of organization, methods and procedure, taken as a whole, and measured by results accomplished, seem to average higher than those of any other War Department bureau with which the board has dealt, and it can suggest no improvements therein except for certain minor changes, largely in accounting procedure, which could be made to advantage if the division were given additional authority or a military position higher than its divisional status. Its present plan of operations provides properly for centralization of advisory and directing functions, decentralization of supervisory and executive functions, and expansion to meet construction requirements of almost any character.

Its personnel showed unusual ability, energy, and courage in grappling with the big problems of design, administration, and construction which were thrown upon them and demonstrated capacity and competency to handle such work satisfactorily. The standards and methods adopted in the selection of its personnel and the character of men chosen reflect credit upon the chief of the division and his advisers. They showed discrimination in the choice of officers, took special pains to put the right man in the right place, where he could work at maximum efficiency, and, in order to eliminate guesswork and selection based on impressions, endeavored to choose only men who had made good and to put them on a class of work with which they were familiar.

The division was itself responsible for creating its present plans of organization and operation. It developed a high order of teamwork by the use of picked men having experience, enthusiasm, and self-confidence, who seem to have been singularly free from pessimism and jealousies, handled work more by mutual suggestion and patriotic self-subordination than through orders and the exercise of authority, and realized their responsibility for promptly supplying the structures and plant facilities essential to the production work of other war bureaus. These men showed zeal, ability, and results of the highest order and were tireless in their efforts to create such a noncombatant army of workers as would ensure the quick construction of all facilities required to maintain an uninterrupted flow of supplies to the Expeditionary Forces.

The Board of Review is of the belief that this work was done at a cost which was greatly increased by national unpreparedness, but which could not have been lessened by placing the work with any other military or civilian bureau.

The Board of Review is of the opinion that the Construction Division should not be disbanded after the accomplishment of its specific war work, but should be utilized to coordinate and handle Army construction and related work in peace times and that the Government can further its interests in no more effective way than by continuing and extending the consolidation of its construction work.

PERSONNEL OF CONSTRUCTION DIVISION.

(Section 22, page 163:) Based on the statements and criticisms above referred to which were made or confirmed by headquarters officers, constructing quartermasters, field auditors and contractors, the disadvantages far outweigh the advantages of civil service regulation on construction work done under war conditions. This would naturally follow from the fact that civil service is defined as the executive branch of the public service as distinguished from military, naval, legislative, and judicial.

The Board of Review is of the opinion that, in an emergency, the bureau charged with construction should be freed entirely from civil service requirements and authority if its chief so recommends, and that its method of advancement and salary list should be revised by the War Department to provide for the prompt payment of adequate salaries and for reasonably rapid advancement when recommended by the chief of a bureau.

Relief might be found for some of these difficulties by the establishment of additional listed grades in the Army, open to both men and women, on the same basis as like positions now held by civilian employees.

The board believes that war experience has shown that construction work in time of war should not be subordinate to any military or civil authority of less authority than a Cabinet officer.

BUILDING DIVISION.

(Section 25, page 172:) Summarizing: The plan embodied in the building division reorganization was to pyramid a group of projects under a supervising constructing quartermaster, and a group of supervising constructing quartermasters under a section chief vested with all necessary authority to assist the constructing quartermaster and contractor in securing promptly necessary advice, data, or information. Had the war continued and the amount of Army construction increased, additional sections would have been established to handle the additional work.

The board knows of no better organization plan for the successful handling of a large number of war or peace construction projects in many locations and of diversified character. Under the plan rulings were made in a proper and orderly manner by the section chiefs and their subordinates, i. e., by those responsible for and in relatively close touch with the projects.

A regional administration for construction work was carefully considered but rejected because of the delays which would result from passing matters through regional offices and the difficulty of keeping these offices in close touch with the headquarters policy and of giving them the benefit of headquarters experience.

Under war conditions a saving of time is vital. Any plan to be successful must avoid delays. These are most frequently due to faulty organization and the overloading of the chief executives with detail. The Construction Division had to be an organization which, as far as possible, would eliminate delays because it had to furnish other branches of the War Department facilities essential to their production programs.

ENGINEERING DIVISION.

(Section 26, page 185:) The Board of Review is of the opinion that the engineering division of the Construction Division was efficient and that its work compares favorably with that done by like organizations in large civilian engineering, architectural, and contracting firms. It cooperated quickly and effectively with other bureaus or corps of the War Department and with other branches of the Construction Division.

The board is convinced that the functions of design, construction, and procurement of materials should, together with authority, responsibility, and accountability, be placed with one division, corps, or department; that it should perform all nontechnical War Department and Government construction work; and that such division or agency should, when necessary, cooperate with other Government agencies in the clearance and allocation of projects and of the material and labor therefor.

CONTRACTS DIVISION.

(Section 27, page 189:) The fees paid to supervising engineers, except on the three cantonments already mentioned and a few other projects, and the salaries paid to their assistants were very small in comparison with the responsibilities involved and the fees commonly paid for similar services on private work.

ACCOUNTING DIVISION.

(Section 25, page 172:) The Board of Review is of the opinion that the department which is responsible for the design and construction of projects should have complete responsibility and accountability for funds and property for the same. The experience of the Construction Division shows it to be impractical and uneconomical to separate accounting from other features of construction.

(Section 30, page 217:) The suspensions (see "Suspensions," section 18) of disbursing officers (constructing quartermasters) for irregularities in the accounts over which they had little control is a very serious matter. It attaches a stigma to an officer's name and injures his personal credit. It is also unjust to these men, many of whom sacrificed paying positions and valuable business connections for patriotic reasons when they entered Government service. They often worked under great strain for long hours, at inadequate salaries fixed over 10 years ago, without any of the overtime payments demanded and received by both skilled and unskilled labor. They contributed notably to the successful outcome of the war and should not now be compelled to wait for relief from the Government except in a case where fraud or misconduct is alleged.

The contractors on such work whose accounts were delayed suffered hardships and financial loss.

Every possible means should be taken promptly to secure the final settlement of these accounts and grant relief to the disbursing officers and contractors from bond and liability by special legislation or other means.

Final audits, if they occur, are made long after the work is completed and the field forces scattered, when their evidence is no longer available. The great difficulties which the delay creates are unnecessary and expensive to the Government and others concerned. It seems obvious that all reports and financial statements made by the field forces should go through the Construction Division for audit and final settlement with the contractor.

MAINTENANCE AND REPAIR DIVISION.

(Section 31, page 223:) The Board of Review finds the organization, personnel, and operating performance of the maintenance and repair division to be efficient and that its record of results accomplished renders expedient a considerable enlargement of its activities.

FIELD ORGANIZATION.

(Section 32, page 229:) The board is therefore of the opinion that the checking of material for quantity and quality is rightly placed in charge of the field auditor.

The board is of the opinion that, in general, the time should be kept and the pay rolls made by the field auditor and that he should supervise the payments in the field.

GENERAL.

(Section 3, page 26:) There was no inconsistency, as has been suggested, in placing the war emergency construction work under the director of operations of the General Staff, instead of placing it under the Division of Purchase, Storage and Traffic, on the theory that it was in a sense production work. Production usually comprises quantity work done by factory processes of more or less routine character, while construction relates primarily to single and often differing structures built by special field methods to suit varying conditions. In many cases it includes the facilities preliminary to or needed for production. The two activities are so essentially dissimilar as to render their combination undesirable.

(Section 41, page 252:) The Board of Review is of the opinion that the correctness of the decision to place this work (other bureau and corps construction) with the Construction Division and to have it act under the Secretary of War and cooperate with the War Industries

Board has been proven by the successful results of such method, particularly in obtaining the speed essential to meeting Army needs.

(Section 6, page 64:) The Board of Review * * * finds that the Secretary of War acted wisely in disapproving the recommended transfer of the Construction Division to the Engineer Corps under war conditions and is further of the opinion that the transfer should not be made under peace conditions and that the Construction Division should be entirely separated from the Quartermaster Corps.

(Section 6, page 64:) It is the belief of the Board of Review that the Cantonment Division was better equipped than the Engineer Corps by professional and commercial acquaintance, training, and experience to deal quickly and effectively with the contracting, industrial, and labor interests which had to be relied upon to execute this work; also that the use, on the cantonment and camp construction, and on the later construction work of the War Department, of commissioned civilian engineers and constructors rather than the Regular Army organization, and the use of other civilian engineers who worked as Government advisers and employees and contractors, released for overseas combat service the limited number of Army officers who had military training and allowed the work to be done by the men best qualified to handle it.

CONTRACT FOR EMERGENCY WORK.

(Section 4, page 39:) The Board of Review has made special inquiry of many contractors, constructing, and administrative officers, field auditors, advisory and supervising engineers, and other competent judges respecting the methods and procedure used and results secured on construction done under the Contract for Emergency Work. The following statement summarizes the more important opinions so obtained.

1. The contract permitted starting work promptly and pushing it rapidly. This prevented loss of time, which meant loss of money and lives and possibly of the war. The speed attained under the contract was responsible for getting troops to France in time to turn the tide which many believed had to be turned in 1918, if at all.

2. The contract could be used without change, irrespective of the size or character of the project.

3. Delay was not necessarily entailed by the frequent lack of definiteness as to general requirements or as to total structures and facilities to be provided.

4. Work could be shut down or rushed to completion at the discretion of the Government.

5. Prices of materials and labor and the quality of the work could be fixed and controlled by the Government, and disputes were

avoided as to these and were largely eliminated as to overhead costs and extras.

6. The contract was unaffected by wide variations constantly occurring in the available supplies of material and labor.

7. Loss of time through the creation of new construction organizations was avoided by the selection and utilization of such existing contracting concerns as were best qualified to execute the work.

8. The contractors, subcontractors, superintendents, engineers, and Government representatives on the various projects were all working with a common interest and to the same end—to finish the work in the least time and at the lowest practicable cost under the conditions prevailing.

The board concurs in the foregoing opinions and conclusions:

The schedule of fees provided in the standard contract seems, in the opinion of practically all who were interviewed, to be generally considered as adequate and fair to all parties. The Board of Review shares this view and, had the war continued, would have suggested no material changes therein. The board has also considered the question as to whether contractors should be selected according to their willingness to do the work for less than these fees. Many such contractors could have been found. The board is convinced that such a plan, if adopted, would have proved disastrous to the execution of the war program and that an effort to save on the fee of a competent contractor by selecting another because of his willingness to work for a smaller fee would have been as false economy as to attempt to hire legal, medical, or other professional service on such a basis. Savings in fees so effected would have been wasted several times over in other ways and would also have entailed fatal delays.

The board finds that the standard contract secured maximum speed, coupled with proper quality, at a less relative cost than could have been done by any other method available and that it operated with smoothness and flexibility and prevented delays from misunderstanding and friction between the Government and its many contractors. As a rule its critics do not seem to have grasped the underlying facts and conditions nor always to have understood the nature of the contract and the reasons for its adoption. No form of war emergency construction contract could eliminate waste, extravagance, or inefficiency which, under war conditions, could only be minimized through the use of experienced Government representatives on the work of administration and supervision, and competent contractors on the work of execution.

The board finds that the use of this form of contract, as finally developed, was well justified and contributed to the success of the emergency construction program; that by its use speed was attained in war construction projects; and that it is probable that such work

could not have been performed in the time available without it or its equivalent.

The board finds that the cost plus with sliding scale and fixed maximum fee contract can not be judged alone by the cost of work done thereunder as it was designed primarily to, and did, secure speed; that unit labor costs thereunder were high, as in all war work, but that the causes did not lie in the contract itself, but rather in the conditions surrounding its application, which were principally high wage scales; overtime; use of any labor obtainable to push work; inefficiency from floating labor; labor shortage; lack of experienced foremen and superintendents; and poor management by some contractors.

The Board of Review is, however, of the opinion that, in the matter of fees the standard contract could have been simplified by the use of a block system of fees based on the payment of a fixed amount for the first block of the cost and of suitable additional amounts for each additional block; and that under such a block system of fees a concern proven satisfactory on emergency construction could probably have been kept at work continuously throughout the war period for a lesser total fee than by subdividing the same work among several contracts executed with him or others.

The board is also of the opinion that Government interests would have been helped in some cases by the insertion of a clause in the standard contract requiring that the duly appointed representative of the general contractor or subcontractor who, under the contract, was to be kept at the site, be one of the chief executives of the corporation, or a member of the firm. Much work had to proceed on general plans while details were being developed and this involved decisions respecting locations, roads, transportation, handling of materials, etc., which required that the contractor's resident executive be a man of large caliber. The insertion of the provision mentioned would have enabled the Government to compel a negligent contractor to give the work the needed quality of supervision. In some instances the contractor tendered his organization and invited the constructing officer to use it. This attitude threw responsibility and duties upon the latter which the contractor alone should have carried. With a competent principal of the contractor on the ground the foremen would have received better information and instructions respecting objectives and methods and time and money would have been saved. These statements do not apply in the majority of cases, as most of the contractors kept an experienced principal almost continuously on the work.

(Section 4, page 39:) The Board of Review has condensed some of the views and conclusions expressed in this section into the following suggestions for improvements:

Have all Government agencies use types of standard construction contracts so far as possible.

Adopt the standard form of Contract for Emergency Work when conditions make it advisable that Government construction be done on a cost-plus basis, as this form of cost-plus contract created by the General Munitions Board and used by the Construction Division of the Army was of great value in the accomplishment of the war emergency work.

Create by a qualified board or committee corresponding standard forms of lump-sum and unit-price construction contracts for ordinary peace-time use.

Prohibit the use of a multiplicity of construction contract forms varying widely and unnecessarily in type, form, and compensation of which many instances may be found among Ordnance contracts.

By adopting contract standards such as those above mentioned, the Government will be better protected and will save time and money and the contractors will receive fair and uniform treatment and the amount which the Government has to pay for its construction will not depend upon the experience of its Government representative who is charged with the negotiation or be controlled by patents or by the special trade or professional knowledge of the contractor. Any compensation properly due him for these features should be specific and not be used as a basis of bargaining as to the fee to be paid for the construction of the needed plant facilities.

AUDITS.

(Section 3, page 26:) The Board of Review did not make audits of War Department construction accounts because it found by investigation that such would not show the most important facts, would give an incomplete picture and would seldom furnish comparative unit costs, the only proper measure of efficiency and economy when corrected for inequalities of conditions. Audits would disclose generally what became of the money that was expended and whether the proofs of expenditure required by the Government accounting system had been secured but would not disclose losses arising from the inefficiency or inadequacy of the administrative organization or the field forces, and would fail to show what the Government received for its money in essential speed or quality of work.

Even if it were possible to determine comparative unit costs there would still remain the questions: Whether the necessity for speed justified the expenditures; whether any of the costs were avoidable and how; and with what period and scale of prices comparisons should be made. The board accordingly decided that it was warranted in making accounting investigations and cost comparisons in certain cases only, the results of which are given later.

RAILROADS.

(Section 14, page 136:) The work done by the railroads and their hearty cooperation was most helpful. They assumed the responsibility of seeing that this important war construction work should not lack needed transportation service. A substantial part of the credit for the results accomplished belongs to these railroads for their efficient work.

LAND AND REAL ESTATE.

(Section 43, page 271:) The board is strongly of the opinion that, as stated in the memorandum of July 18, 1918, by the Director of Purchase, Storage and Traffic, the construction work and the purchase of real estate should be under one organization unit; that, in time of war, it is very important that land and real estate matters should be handled with the greatest speed and that wherever practicable, proper safeguarding of Government interests requires the taking of a renewable lease or an option to purchase or the purchase, at a reasonable price, of land or other real estate on which the Government improvements are placed.

(Section 43, page 271:) The War Department in emergencies should be authorized to buy land without special legislative authority. Such a provision would have saved much time and money, especially in Ordnance Department expenditures made on land owned by other parties. The Secretary of War might be authorized in emergency to buy necessary land out of funds appropriated for specific projects, as in the case of army camps. In the case of the railway right of way of the Norfolk terminal the land was condemned under the pure-food law in order to meet emergency conditions.

CONSOLIDATION OF GOVERNMENT CONSTRUCTION.

(Section 3, page 26:) With respect to these and related matters the board is of the opinion:

That as, under peace conditions, and to a large extent under war conditions also, nearly all construction and the engineering incidental thereto is of a civil character, the principal exception in each instance being that which relates to artillery and combat work, civilian engineers and experts must constitute the main reliance of the country for the construction work of both peace and war.

That as time does not permit including thorough and varied training in practical commercial work in the education of Army Engineer officers they will be outclassed by civilian engineers on most construction work but should nevertheless be given as much of such training as possible because they will otherwise become a clog instead of a help to those whom they may be called upon to direct but whose work and problems they can not properly understand without it.

That, so far as practicable, the directing and executive engineers on most Government construction should be drawn from civilian life, be unhampered in their work by differences of military rank and stand on a peace and not a military or war basis as to classification and relationships.

That it is unwise to ask the War Department to do any national construction and engineering work that civilians can do, because, in another war, its engineers will again be unable to handle such home work in addition to their military work and that the practical training given to Army Engineers in peace time should be provided by detailing them to work on construction on a parity with civilians, as any plan which gives them the special status of military rank on construction work will prove unsatisfactory because Army rank tends to insulate them from the most educational features of the work.

That, if the organization handling the nation's construction in times of peace were directed by the War Department, it would in time of war be disrupted by the calling of its chiefs into active service at the very time it was most urgently needed for war-emergency work.

The board is impressed with the benefits which were secured by consolidating the construction work of various War Department bureaus and believes that much other Government construction could be merged to advantage and that national preparedness for peace or war would be effectively promoted by creating a Federal construction bureau with an essentially civilian organization and personnel to administer and supervise all Government construction except that of a technical military character. Such a bureau could handle more expeditiously and economically than the War Department many construction problems which, in the past, have been loaded on to the latter, which can not be made an efficient peacetime administrative-construction bureau because its functions are essentially military and its operations are hampered by complications of military organization and rank inseparable from Army activities. The projects of such a construction bureau would afford better opportunities for the practical education of Army officers, and cost the Government much less than the present plan of placing much of such work under the War Department. All of the principal national engineering societies advocate the formation of a construction bureau of the character above described.

(Section 45, page 275:) To handle properly a large volume of Government-construction work control must be exercised through centralized supervision. This should fix the general standards and policies and be decentralized as to the design and execution of individual projects, so permitting the proper adaptation of general plans to local conditions by those in direct charge of each piece of work.

The War Department alone should not be relied upon and made responsible for the success of the Army in war. In peace times its status is necessarily one of inaction and such an organization, normally inert, can not of itself expand speedily to the full proportions necessary for meeting all Army needs in a war emergency and assure the country of protection. In time of war the War Department is expanded under great strain from a relatively small to the largest Government department. At such times other departments, particularly those having to do with internal affairs, are contracted and many of their activities practically suspended. As the Government has to utilize civilians to perform its construction work during war it is desirable to relieve the War Department from dangerous strain in war by having a peace-time construction organization which, being unhampered by military regulations, could work at maximum efficiency and in war could handle emergency construction speedily and effectively. A sufficient amount and variety of work to keep its personnel well trained would be provided under such a plan without enlarging the normal and proper scope of Federal activities.

Observation indicates that satisfactory results in the war emergency construction have been accomplished largely by, and in degree proportionate to, the freeing of experienced constructors from control by Army officers. This leads to the conclusion that neither Military Academy training nor Army experience can of itself insure fitness or ability to handle construction work.

(Section 45, page 275:) After full consideration the Board of Review finds that Government-construction work for public use should not be done by the War Department and that the execution of some of the construction now assigned by law to that department should be transferred to a civilian-construction bureau.

CONSOLIDATION OF GOVERNMENT INSPECTION.

(Section 47, page 281:) The Board of Review finds that the consolidation of Government inspection under one competent and thoroughly experienced bureau is most desirable.

OFFICERS' RESERVE CORPS.

(Section 48, page 282:) The Board of Review is of the opinion that the Officers' Reserve Corps members engaged on the emergency-construction work of the War Department could have rendered better service if the time available for their training had permitted giving them more instruction in Army-organization methods, relations and discipline, as many civilians, especially the older ones, entering the Army do not seem to grasp the need of conforming to

its requirements. There also seems to be considerable room for improvement on the part of the officers of the Reserve Corps and those of the Regular Army, who represent respectively the civilian and military branches of engineering, in developing adaptability to the other's viewpoint.

The board finds that the fullest encouragement should be given to the organization and development of the Officers' Reserve Corps in order to furnish military instruction to the constructors and engineers who may be needed for future emergency construction as well as for other work.

(Section 3, page 26:) That, as the value of the Officers' Reserve Corps has been so conspicuously proven on war-construction work at home and overseas, and as, in time of war, the Nation must rely largely upon such a corps, its development and training should receive the fullest encouragement from the War Department.

PART VI.

EXHIBITS.

EXHIBIT No. 1.

List of projects built by the cantonment and construction divisions, with approximate estimated cost to June 30, 1919.

[* Denotes projects on which the Construction Division had general supervision only, the work being in charge of a constructing officer detailed from the bureau of the War Department requiring the work, and no funds being transferred to the Construction Division. On projects marked † the cost of land is included.]

Symbol No.	Name.	Location.	Approximate estimated cost.
ARTILLERY.			
<i>Field.</i>			
6016	Camp Bragg.....	Fayetteville, N. C.....	†\$11,000,000
6010	Camp Knox.....	Stithton, Ky.....	†18,950,000
6015	Camp North Jackson.....	Columbia, S. C.....	3,400,000
	Total.....		33,350,000
<i>Heavy.</i>			
86	Camp Abraham Eustis.....	Lee Hall, Va.....	†12,160,000
	Total.....		45,510,000
CAMPS, GENERAL.			
<i>Cantonments, National Army.</i>			
2001	Custer.....	Battle Creek, Mich.....	12,964,300
2002	Devens.....	Ayer, Mass.....	11,889,800
2003	Dodge.....	Des Moines, Iowa.....	9,943,500
2004	Dix.....	Wrightstown, N. J.....	12,687,600
2005	Funston.....	Fort Riley, Kans.....	11,293,100
2006	Gordon.....	Atlanta, Ga.....	11,217,800
2007	Grant.....	Rockford, Ill.....	14,268,000
2008	Jackson.....	Columbia, S. C.....	12,298,100
2009	Lee.....	Petersburg, Va.....	18,639,300
2010	Lewis.....	American Lake, Wash.....	8,808,800
2011	Meade (including Franklin).....	Admiral, Md.....	18,192,400
2012	Pike.....	Little Rock, Ark.....	13,083,700
2013	Sherman.....	Chillicothe, Ohio.....	12,826,000
2014	Taylor.....	Louisville, Ky.....	8,439,500
2015	Travis.....	San Antonio, Tex.....	8,384,100
2016	Upton.....	Yaphank, N. Y.....	14,949,200
	Total.....		199,886,200
<i>Camps, National Guard.</i>			
2501	Beauregard.....	Alexandria, La.....	5,408,200
2502	Bowie.....	Fort Worth, Tex.....	3,777,400
2503	Cody.....	Deming, N. Mex.....	4,210,000
2504	Doniphan.....	Fort Sill, Okla.....	2,913,300
2505	Fremont.....	Palo Alto, Calif.....	2,546,600
2506	Greene.....	Charlotte, N. C.....	4,797,800
2507	Hancock.....	Augusta, Ga.....	4,636,900
2508	Kearney.....	Linda Vista, Calif.....	4,253,700
2509	Logan.....	Houston, Tex.....	3,969,200
2510	MacArthur.....	Waco, Tex.....	4,604,100
2511	McClellan.....	Anniston, Ala.....	6,788,600
2512	Sevier.....	Greenville, S. C.....	6,250,500
2513	Shelby.....	Hattiesburg, Miss.....	5,563,200
2514	Sheridan.....	Montgomery, Ala.....	3,578,400
2515	Wadsworth.....	Spartanburg, S. C.....	5,257,700
2516	Wheeler.....	Macon, Ga.....	4,087,800
	Total.....		72,643,400

List of projects built by the cantonment and construction divisions, with approximate estimated cost to June 30, 1919—Continued.

Symbol No.	Name.	Location.	Approximate estimated cost.
LIMITED SERVICE.			
<i>Camp.</i>			
.....	Syracuse.....	Syracuse, N. Y.....	\$280,000
PORTO RICO.			
<i>Camp.</i>			
22	Las Casas.....	San Juan, P. R.....	2,015,000
GUARD DETACHMENTS.			
<i>Camps.</i>			
7003	Hawthorne race track.....	Chicago, Ill.....	190,000
7025	New York Dry Dock Co.....	New York, N. Y.....	270
188	Potomac Park.....	Washington, D. C.....	491,000
145	Provost Guard.....	New York, N. Y.....	68,000
7028	Sales commissary.....	Washington, D. C.....	13,900
7012	Seattle Construction & Dry Dock Co.....	Seattle, Wash.....	1,500
168	New York Gas Defense Plant.....	Astoria, Long Island, N. Y.....	275,000
6003	Enlisted men's barracks.....	Norfolk, Va.....	269,000
Total.....			1,308,670
MEXICAN BORDER.			
<i>Camps.</i>			
7020	Big Bend district (Candelaria, Evetts Ranch, Glenn's Spring, Holland's Ranch, Marfa, Presidio, Ruidosa, Terlingua).....	Texas.....	45,000
7014	Brownsville district (Brownsville, Donna, Donna Pump, Fort Brown, Harlinger, Llano Grande, Mercedes, Mercedes pump, San Benito pump, San Pedro ranch).....	.....do.....	80,000
7023	California district (Campo, San Ysidro, Tecate).....	California.....	2,700
6023	Columbus district (Furlong).....	New Mexico.....	1,360
3017	Del Rio district (Del Rio, Devils River Bridge, Pecos High Bridge, Pinto Creek).....	Texas.....	570,000
7022	Douglass district (Hachita, Harry J. Jones).....	Arizona.....	210,000
7018	Eagle Pass district (Eagle Pass, Indio ranch).....	Texas.....	3,200
75	El Paso district (El Paso, Fort Bliss).....	.....do.....	552,000
3009	Fort Clark district (Fort Clark).....	.....do.....	460,000
3047	Laredo district (Dolores, Dolores mine, Del Mesa, Fort McIntosh, Guadalupe, San Ignacio, Santa Rosa, Santa Tomas, Zapata).....	.....do.....	62,000
3063	Rio Grande district (Fort Sam Fordyce, Fort Ringold, McAllen, Roma, Salinino).....	.....do.....	16,000
7031	Sierra Blanca district (Fabens, Fort Hancock, Hester's ranch, Neville's ranch, Polvo).....	.....do.....	1,000
3056	Tenth Cavalry district (Arivaca, Fort Huachuca, Lochiel, Nogales).....	Arizona.....	190,000
Total.....			2,193,260
Total.....			278,326,530
CHEMICAL WARFARE SERVICE.			
<i>Camps.</i>			
160	Kendrick.....	Lakehurst, N. J.....	645,000
6014	Leach.....	Washington, D. C.....	450,000
198	Willoughby.....	Willoughby, Ohio.....	233,600
Total.....			1,328,600
<i>Experimental stations.</i>			
128	American University.....	Washington, D. C.....	380,000
<i>Gas plants.</i>			
155	Hastings gas plant.....	Hastings on Hudson, N. Y..	520,000
154	Kingsport gas plant.....	Kingsport, Tenn.....	487,400
201	National Aniline & Chemical Co.....	Buffalo, N. Y.....	556,000
64	U. S. Chemical Plant No. 4.....	Saltville, Va.....	2,384,350
Total.....			3,947,750

List of projects built by the cantonment and construction divisions, with approximate estimated cost to June 30, 1919—Continued.

Symbol No.	Name.	Location.	Approximate estimated cost.
CHEMICAL WARFARE SERVICE—continued.			
Gas-defense plants.			
64	Long Island gas-defense plant	Long Island City, N. Y.	\$190,000
	Edgewood Arsenal (Contract No. 1: Filling plant No. 1, filling plant No. 2, filling plant No. 3, chemical plant, mustard-gas plant. Contract No. 2: Base hospital, permanent cantonments, permanent roads. Contract No. 3: Chlorine and caustic soda plants, water system, central power station. Contract No. 4: High-tension transmission lines. Contract No. 5: Dredging Bush River).	Edgewood, Md.	25,000,000
Total			30,846,350
EMBARKATION SERVICE.			
Camps.			
6007	Merritt	Dumont, N. J.	11,450,000
8002	Mills	Garden City, Long Island, N. Y.	11,200,000
6008	Alexander, Hill, Stuart	Newport News, Va.	16,500,000
			39,150,000
Depots.			
112	Charleston	Charleston, S. C.	795,000
Total			39,945,000
ENGINEER CORPS.			
Camps.			
62	Forrest	Fort Oglethorpe, Ga.	(¹)
6011	Glenburnie	Glenburnie, Md.	125
23	Humphreys	Accotink, Va.	† 13,140,000
7006	Laurel	Laurel, Md.	7,000
Total			13,147,125
FRANCE, CONSTRUCTION IN.			
Meat-storage and ice-making plants.			
51	Original plant	Gievres, France	} 4,064,145
51	No. 1	Bordeaux, France	
51	No. 2	(No information) France	
INFANTRY.			
Camps.			
6028	Bartlett	South Framingham, Mass.	2,000
3044	Pine	Madison Barracks, Md.	2,780
6017	Robinson	Sparta, Wis.	363,500
39	Stanley	Leon Springs, Tex.	1,350,000
			1,718,280
Schools.			
6022	Benning	Columbus, Ga.	† 5,315,000
6077	Perry	Port Clinton, Ohio	20,000
3057	Otis	Canal Zone	110,000
			5,445,000
Total			7,163,280

¹Included in No. 62, "Permanent posts."

List of projects built by the cantonment and construction divisions, with approximate estimated cost to June 30, 1919—Continued.

Symbol No.	Name.	Location.	Approximate estimated cost.
MEDICAL CORPS.			
<i>Camps.</i>			
6018	Crane.....	Allentown, Pa.....	\$156,600
6004	Summerall.....	Tobyanna, Pa.....	1,900
			158,500
<i>Depots.</i>			
5012	Medical supply.....	New York, N. Y.....	14,500
5014	.....do.....	Washington, D. C.....	3,000
			17,500
<i>Hospitals.</i>			
Base (included in 15 National Army camps and 16 National Guard camps).			
Debarcation:			
5001	No. 1.....	Ellis Island, N. Y.....	23,500
31	No. 2.....	Fox Hills, N. Y.....	2,748,000
166	No. 3, Greenhut Building.....	New York, N. Y.....	283,700
256	No. 3, Cluett Building.....	do.....	36,100
222	No. 5, Grand Central Palace.....	do.....	177,840
265	No. 51.....	Hampton, Va.....	260,000
5007	No. 52.....	Richmond, Va.....	53,270
			3,582,410
Embarkation (included in cost of embarkation camps).			
General:			
7	No. 1.....	Williamsbridge, N. Y.....	522,500
13	No. 2.....	Fort McHenry, Md.....	2,159,640
37	No. 3.....	Colonia, N. J.....	2,410,000
3095	No. 4.....	Fort Porter, N. Y.....	10,700
140	No. 5.....	Fort Ontario, N. Y.....	563,000
66	No. 6.....	Fort McPherson, Ga.....	(3)
85	No. 7.....	Baltimore, Md.....	300,900
33	No. 8.....	Otisville, N. Y.....	1,696,000
170	No. 9.....	Lakewood, N. J.....	188,350
5013	No. 10.....	Boston, Mass.....	84,150
78	No. 11.....	Cape May, N. J.....	41,680
5005	No. 12.....	Biltmore, N. C.....	30,200
62	No. 13.....	Dansville, N. Y.....	(8)
	No. 14.....	Fort Oglethorpe, Ga.....	(1)
	No. 15.....	Corpus Christi, Tex.....	(2)
111	No. 16.....	New Haven, Conn.....	337,200
108	No. 17.....	Markleton, Pa.....	108,000
5002	No. 18.....	Waynesville, N. C.....	73,700
77	No. 19.....	Azalea, N. C.....	2,753,100
3085	No. 20.....	Whipple Barracks, Ariz.....	1,725,000
94	No. 21.....	Denver, Colo.....	3,205,000
5015	No. 22.....	Philadelphia, Pa.....	65,900
5008	No. 23.....	Hot Springs, N. C.....	103,200
5006	No. 24.....	Pittsburgh, Pa.....	206,000
	No. 25.....	Fort Benjamin Harrison, Ind.....	(4)
16	No. 26.....	Fort Des Moines, Iowa.....	240,000
3020	No. 27.....	Fort Douglas, Utah.....	695,000
3091	No. 28.....	Fort Sheridan, Ill.....	3,050,000
3074	No. 29.....	Fort Snelling, Minn.....	497,000
3094	No. 30.....	Plattsburg Barracks, N. Y.....	245,000
5011	No. 31.....	Carlisle, Pa.....	194,000
210-12	No. 32.....	Chicago, Ill.....	108,200
3042	No. 33.....	Fort Logan H. Roots, Ark.....	12,000
201-7	No. 34.....	Norfolk, Mass.....	36,400
210-8	No. 35.....	West Baden, Ind.....	123,700
210-4	No. 36.....	Detroit, Mich.....	91,400
3044	No. 37.....	Madison Barracks, N. Y.....	105,000
210-2	No. 38.....	East View, N. Y.....	109,500
5009	No. 39.....	Long Beach, Long Island, N. Y.....	24,900
210-18	No. 40.....	St. Louis, Mo.....	129,500

² Included in No. 66, "Permanent posts."

³ Included in "Maintenance and repair."

⁴ Included in No. 3005, "Permanent posts."

List of projects built by the cantonment and construction divisions, with approximate estimated cost to June 30, 1919—Continued.

Symbol No.	Name.	Location.	Approximate estimated cost.
MEDICAL CORPS—continued.			
<i>Hospitals—Continued.</i>			
84	Fort Bayard.....	Fort Bayard, N. Mex.....	\$673,000
5003	Letterman.....	San Francisco, Calif.....	115,000
68	Walter Reed.....	Washington, D. C.....	1,670,000
210-14	Deaf and dumb asylum.....	Columbus, Ohio.....	500
210-13	East Side High School.....	Cincinnati, Ohio.....	1,100
210-3	Exposition Park.....	Rochester, N. Y.....	11,800
210-11	Field Museum.....	Chicago, Ill.....	92,400
210-9	Ford Building (alterations).....	Milwaukee, Wis.....	6,500
210-10	do.....	Des Moines, Iowa.....	1,600
158	Lawrenceville.....	Lawrenceville, N. J.....	47,500
255	Motor Convoy Service.....	Detroit, Mich.....	5,000
			24,880,230
<i>Schools.</i>			
5010	Army Medical.....	Washington, D. C.....	5,600
Total.....			28,644,240
MILITARY AERONAUTICS, DIVISION OF.			
<i>Camps.</i>			
241*	Dick.....	Dallas, Tex.....	6,000
92*	John Wise.....	San Antonio, Tex.....	95,275
250*	Morrison.....	Morrison, Va.....	6,980
			108,255
<i>Depots.</i>			
270*	Air Service.....	Morrison, Va.....	96,400
194	Aircraft Production.....	Detroit, Mich.....	65,000
226*	Aviation general repair.....	Dallas, Tex.....	128,940
227*	do.....	Indianapolis, Ind.....	108,000
141*	Aviation general supply.....	Dayton, Ohio.....	42,100
253	do.....	Fairfield, Ohio.....	118,135
48	do.....	Middletown, Pa.....	1,246,000
220*	do.....	Philadelphia, Pa.....	5,700
135*	Aviation general supply and repair.....	Richmond, Va.....	119,000
133	Aviation general supply.....	San Antonio, Tex.....	76,100
134	Aviation storage depot.....	Detroit, Mich.....	26,000
136	Balloon, general school.....	Richmond, Va.....	72,600
			2,103,975
<i>Flying fields.</i>			
6009	Alfred Vail.....	Little Silver, N. J.....	220,650
252*	Barron.....	Everman, Tex.....	74,598
126	Bolling.....	Anacostia, D. C.....	290,000
224*	Brindley.....	Commack, Long Island, N. Y.....	141,290
247*	Brooks.....	Bergs, Tex.....	27,500
245*	Call.....	Wichita Falls, Tex.....	78,298
231*	Carlstrom.....	Arcadia, Fla.....	257,259
219*	Carruthers.....	Benbrook, Tex.....	155,098
143*	Chandler.....	Essington, Pa.....	11,940
81*	Chanute.....	Rantoul, Ill.....	38,618
239*	Dorr.....	Arcadia, Fla.....	330,000
234	Eberts.....	Lonoke, Ark.....	92,940
144	Ellington.....	Olcott, Tex.....	269,880
246	Emerson.....	Columbia, S. C.....	3,000
277*	France.....	Canal Zone.....	50,400
142*	Gertsner.....	Holmwood, La.....	317,773
79*	Hazlehurst.....	Mineola, Long Island, N. Y.....	913,951
225*	Henry J. Damm.....	Babylon, Long Island, N. Y.....	127,365
157*	Kelly Field No. 1 and No. 2.....	San Antonio, Tex.....	348,402
229	Landing.....	Fords Island, Hawaii.....	72,500
233	Langley.....	Hampton, Va.....	700,535
153*	Love.....	Dallas, Tex.....	57,698
273*	Lufberry.....	Mineola, Long Island, N. Y.....	19,904
254*	McCook.....	Dayton, Ohio.....	45,800
69*	March.....	Alesandro, Calif.....	858,600
70*	Mather.....	Mills, Calif.....	901,000
272*	Mitchel.....	Mineola, Long Island, N. Y.....	24,123

List of projects built by the cantonment and construction divisions, with approximate estimated cost to June 30, 1919—Continued.

Symbol No.	Name.	Location.	Approximate estimated cost.
MILITARY AERONAUTICS, DIVISION OF—contd.			
<i>Flying fields—Continued.</i>			
91*	Park.....	Millington, Tenn.....	(⁶)
46*	Payne.....	West Point, Miss.....	\$891,340
151*	Post.....	Fort Sill, Okla.....	69,352
91*	Rich.....	Waco, Tex.....	(⁵)
38*	Rockwell.....	San Diego, Calif.....	460,654
271*	Roosevelt.....	Mineola, Long Island, N. Y.....	66,265
91-82	Scott.....	Avia, Ill.....	44,780
162	Selfridge.....	Mount Clemens, Mich.....	143,166
45*	Souther.....	Arles, Ga.....	1,347,480
249*	Taliaferro.....	Hicks, Tex.....	135,098
91*	Taylor.....	Pike Road, Ala.....	(⁵)
82-248*	Wilbur Wright.....	Fairfield, Ohio.....	187,623
91*	General authorization.....		762,380
80*	do.....		93,600
			10,630,950
<i>Testing fields.</i>			
104*	No. 1.....	Dayton, Ohio.....	635,000
105	No. 2.....	Buffalo, N. Y.....	445,000
106	No. 3.....	Detroit, Mich.....	210,000
107	No. 4.....	Elizabeth, N. J.....	115,000
			1,405,000
<i>Gas plants.</i>			
14	No. 1 and No. 2.....	Fort Worth, Tex.....	113,000
39	No. 3.....	Petrolia, Tex.....	170,000
			283,000
<i>Schools.</i>			
120	Aerial Gunnery (Chapman).....	Miami, Fla.....	928,700
49*	Aerial Observation.....	Fort Sill, Okla.....	38,000
47*	Aerial Photography.....	Rochester, N. Y.....	35,000
200	Aviation Mechanics.....	St. Paul, Minn.....	245,000
93*	Bakers (Kelly Field).....	San Antonio, Tex.....	55,000
131	Balloon Observers.....	Arcadia, Calif.....	518,100
121	do.....	Lee Hall, Va.....	†884,700
71	Balloon Observers (Florence).....	Fort Omaha, Nebr.....	381,150
243*	Service School (University of Texas).....	Austin, Tex.....	55,000
			3,140,650
<i>Shops.</i>			
65*	Engine and plane repair.....	Montgomery, Ala.....	770,240
<i>Warehouses.</i>			
60*	Aviation, general (Kelly Field).....	San Antonio, Tex.....	220,000
147	Aviation, general.....	Little Rock, Ark.....	985,000
			1,205,000
<i>Miscellaneous.</i>			
129	Johns Hopkins (hangar).....	Baltimore, Md.....	32,000
214	104-106 West Fourteenth Street.....	New York, N. Y.....	18,500
215	Ford Building (alterations).....	Detroit, Mich.....	29,000
			79,500
Total.....			19,726,570
MISCELLANEOUS CONSTRUCTION.			
<i>Barracks, Bureau of Standards.</i>			
196	Bureau of Standards.....	Washington, D. C.....	81,000

⁶ Included in general authorization.

List of projects built by the cantonment and construction divisions, with approximate estimated cost to June 30, 1919—Continued.

Symbol No.	Name.	Location.	Approximate estimated cost.
MILITARY AERONAUTICS, DIVISION OF—contd.			
<i>Temporary buildings.</i>			
103	Temporary offices, D, E, and F.....	Washington, D. C.....	\$2,375,000
<i>Various buildings.</i>			
242	Record storage building (Construction Division).....	Baltimore, Md.....	50,200
7024	Dry-cleaning plant.....	West Hoboken, N. J.....	4,200
7010	East Potomac Park.....	Washington, D. C.....	53,000
7021	Ford Building (alterations).....	do.....	40,000
7032	Garage, Twenty-fourth and M Streets.....	do.....	21,700
32	Telephone switchboard building.....	do.....	130,000
138	U. S. construction lumber depot.....	Gilmartin, Va.....	530,000
174	Army War College.....	Washington, D. C.....	133,500
			962,600
<i>Roads.</i>			
118	Alexandria, Va., to Camp Humphreys.....	.....	375,000
228	Fayetteville, N. C., to Camp Bragg.....	.....	(⁶)
235	Fort Monroe to Langley Field to Hampton, Va.....	.....	495,000
232	Naval base No. 2 to Camp Morrison, Va.....	.....	1,280,000
236	Portsmouth, Va., to Norfolk, Va.....	.....	435,000
			2,585,000
<i>Water and electric power projects.</i>			
206	Big Bethel water development.....	Hampton, Va.....	1,029,000
286	Duquesne Light Co.....	Pittsburgh, Pa.....	1,445,000
169	Electric power.....	Charleston, S. C.....	350,000
203	Harwood water development.....	Orianna, Va.....	1,175,000
285	Lorain County Electric Co.....	Lorain, Ohio.....	1,250,000
161	Norfolk water supply.....	Norfolk, Va.....	275,000
156	Water development.....	Charleston, S. C.....	450,000
208	do.....	Portsmouth, Va.....	2,200,000
216	do.....	Newport News, Va.....	150,000
217	West Penn Power Co.....	Springdale, Pa.....	2,409,000
287	Water development.....	Skiffs Creek, Va.....	326,000
			11,059,000
Total.....			17,062,600
MOTOR TRANSPORT CORPS.			
<i>Camps.</i>			
30	Holabird.....	Baltimore, Md.....	\$5,330,000
28	Jessup.....	Atlanta, Ga.....	\$1,265,000
98	Normoyle.....	San Antonio, Tex.....	\$1,779,000
297	Barracks.....	Philadelphia, Pa.....	20,600
			8,394,600
ORDNANCE DEPARTMENT.			
<i>Acid plants.</i>			
211	Sulphuric acid.....	Emporium, Pa.....	205,000
237	do.....	Grand Rapids, Mich.....	7,950
183	do.....	Mount Union, Pa.....	353,000
			565,950
<i>Arms, shell, and ammunition plants.</i>			
187	Marlin Rockwell Co.....	Delaware City, Del.....	2,500,000
190	Peters Cartridge Co.....	Cincinnati, Ohio.....	223,850
192	Western Cartridge Co.....	East Alton, Ill.....	335,000
197	Laclede Gas Co. (shell manufacturing).....	St. Louis, Mo.....	542,300
193	do.....	do.....	597,600
199	Milton Manufacturing Co. (shell manufacturing).....	Milton, Pa.....	350,000
184	Phosphorus plant.....	Fairmont, W. Va.....	133,300
189	Hero Manufacturing Co.....	Philadelphia, Pa.....	150,000
			4,832,050

⁶ Included in No. 6016, "Artillery."

List of projects built by the cantonment and construction divisions, with approximate estimated cost to June 30, 1919—Continued.

Symbol No.	Name.	Location.	Approximate estimated cost.
ORDNANCE DEPARTMENT—continued.			
<i>Arsenals.</i>			
258	Augusta.....	Augusta, Ga.....	\$32,000
164*	Benecia.....	Benecia, Calif.....	110,000
119	Frankford.....	Philadelphia, Pa.....	2,730,000
280	Hawaii.....	Hawaiian Islands.....	9,800
114*	New York.....	New York, N. Y.....	33,000
195*	Picatinny.....	Dover, N. J.....	385,000
9	Raritan (including lighters).....	Metuchen, N. J.....	13,300,000
89*	Rock Island.....	Rock Island, Ill.....	3,224,000
163*	San Antonio.....	San Antonio, Tex.....	165,000
76*	Springfield.....	Springfield, Mass.....	283,000
125*	Watertown.....	Watertown, Mass.....	380,000
109*	Watervliet.....	Watervliet, N. Y.....	1,180,000
			21,831,800
<i>Storage depots.</i>			
2	Animal quarantine.....	Baltimore, Md.....	101,300
35	Augusta.....	Augusta, Ga.....	273,750
127	Charleston (Ordnance section).....	Charleston, S. C.....	15,200,000
8	Curtis Bay (including lighters).....	Curtis Bay, Md.....	7,170,300
159	Delaware general supply.....	Fedricktown, N. J.....	14,900,000
42	Middletown.....	Middletown, Pa.....	1,298,700
167	Ordnance warehouses.....	South Bethlehem, Pa.....	22,610
10	Pig Point (including lighters).....	Pig Point, Va.....	3,396,700
41	Sandy Hook.....	Sandy Hook, N. J.....	888,900
124	Springfield (Ordnance section).....	Springfield, Mass.....	80,000
284	Tuckahoe.....	Tuckahoe, N. J.....	1,400
	South Amboy.....	South Amboy, N. J.....	90,000
			23,423,660
<i>Gas plants.</i>			
218	Toxic acid.....	Croyland, Pa.....	325,600
<i>Gun plants.</i>			
	Neville Island.....	Pittsburgh, Pa.....	34,500
<i>Housing, barracks, and schools.</i>			
113	American Brake Shoe Co.....	Erie, Pa.....	472,500
132	Bethlehem Steel Co.....	Bethlehem, Pa.....	487,900
5	Mobile Ordnance School.....	Clintonville, Wis.....	11,600
4	do.....	Kenosha, Wis.....	5,010
6	do.....	Peoria, Ill.....	34,500
6024	Ordnance School.....	St. Louis, Mo.....	1,650
			1,013,160
<i>Loading plants.</i>			
115	Bag loading.....	Richmond, Va.....	6,188,300
58	do.....	Tullytown, Pa.....	6,100,000
72	do.....	Woodbury, N. J.....	4,622,600
			16,910,900
<i>Manufacturing plant extensions.</i>			
212	Holt Manufacturing Co.....	Peoria, Ill.....	922,000
180	Locomobile Co.....	Bridgeport, Conn.....	241,500
221	National Cash Register Co.....	Dayton, Ohio.....	250,000
34	New Britain Machine Co.....	New Britain, Conn.....	131,500
122	Saxon Motor Co.....	Detroit, Mich.....	40,000
293	Symmington Corporation.....	Chicago, Ill.....	460,000
			2,095,000
<i>Nitrate plants.</i>			
171	No. 2.....	Muscle Shoals, Ala.....	60,000,000
172	No. 3.....	Toledo, Ohio.....	7,500,000
173	No. 4.....	Ancor, Ohio.....	7,500,000
			75,000,000

List of projects built by the cantonment and construction divisions, with approximate estimated cost to June 30, 1919—Continued.

Symbol No.	Name.	Location.	Approximate estimated cost.
ORDNANCE DEPARTMENT—continued.			
<i>Powder and explosive plants.</i>			
139	Picric acid plant.....	Little Rock, Ark.....	\$6,900,000
175	.....do.....	Grand Rapids, Mich.....	3,360,500
148	.....do.....	Brunswick, Ga.....	9,200,000
186	Tetryl plant.....	Senter, Mich.....	214,000
204	T. N. T. plant.....	Giant, Calif.....	286,400
205*	Toluol recovery plant.....	Everett, Mass.....	30,000
57*	U. S. explosive plant.....	Nashville, Tenn.....	65,000,000
25	.....do.....	Nitro, W. V.....	63,000,000
			147,990,900
<i>Proving grounds.</i>			
52*	Aberdeen.....	Aberdeen, Md.....	16,000,000
207	Clear Springs.....	Clear Springs, Md.....	120,000
116	Erie (Camp Perry).....	Port Clinton, Ohio.....	4,833,000
202	Elizabethport.....	Elizabethport, N. J.....	170,000
95	Lakehurst.....	Lakehurst, N. J.....	1,300,000
110	Savanna.....	Savanna, Ill.....	579,800
36	Saybrook.....	Saybrook, Conn.....	59,000
137	Scituate.....	Scituate, Mass.....	1,637,200
24	Whiting.....	Whiting, N. J.....	1,000
			24,700,000
Total.....			318,723,520
POSTS, PERMANENT, ARMY.			
<i>Coast defense.</i>			
4001	Narragansett Bay district (Forts Adams, Greble, Wetherell, Getty, Kearney).....	Narragansett, R. I.....	604,000
4002	Boston district (Forts Standish, Strong, Banks, Heath, Revere, Andrews, Warren).....	Boston, Mass.....	350,000
4003	Baltimore district (Forts Howard, Smallwood, Carroll, Armistead).....	Baltimore, Md.....	180,000
4004	San Francisco district (Forts Winfield Scott, Miley, Mason, Funston, Barry, Baker, McDowell).....	San Francisco, Calif.....	340,000
4005	Portland district (Forts Williams, Prehle, McKinley, Levett, Baldwin, Lyon).....	Portland, Me.....	360,000
4006	Pensacola district (Forts Barrancas, Pickens, McRee).....	Pensacola, Fla.....	505,000
4007	Columbia district (Forts Stevens, Columbia, Canby).....	Columbia River, Oreg.....	480,000
4008	Chesapeake Bay district (Forts Monroe, Wool, Story).....	Chesapeake Bay, Va.....	2,850,000
4009	Puget Sound district (Forts Worden, Casey, Flagler, Ward, Whitman, Lawton).....	Puget Sound, Wash.....	500,000
4010	Cape Fear district (Fort Caswell).....	Cape Fear, N. C.....	650,000
4011	Portsmouth district (Forts Constitution, Stark, Foster).....	Portsmouth, N. H.....	125,600
4012	Tampa district (Forts Dade, De Soto).....	Tampa, Fla.....	173,000
4013	The Delaware district (Fort Du Pont, Fort Mott, Cape May, Henlopen).....	Delaware Bay, Del.....	370,000
4014	Savannah district (Forts Screven, Fremont).....	Savannah, Ga.....	157,000
4015	Mobile district (Forts Morgan, Gaines).....	Mobile, Ala.....	78,000
4016 and 4024	New York Harbor district (Forts Totten, Schuyler, Slocum, Hamilton, Wadsworth, Tilden, Hancock).....	New York, N. Y.....	1,903,250
4017	Potomac district (Forts Washington, Hunt).....	Potomac River, Md.....	125,000
4018	New Orleans district (Jackson Barracks, Fort St. Phillip).....	New Orleans, La.....	120,000
4019	Key West district (Key West Barracks, Fort Taylor).....	Key West, Fla.....	171,000
4020	Los Angeles district (Fort MacArthur).....	Los Angeles, Calif.....	607,000
4021	Long Island Sound district (Forts H. G. Wright, Perry, Michie, Mansfield, Taylor).....	Long Island, N. Y.....	730,000
4022	Charleston district (Forts Moutrie, Sumter).....	Charleston, S. C.....	346,000
4023	San Diego district (Forts Po Pico, Rosecrans).....	San Diego, Calif.....	310,000
4025	Galveston district (Forts Crockett, San Jacinto, Travis).....	Galveston, Tex.....	268,000
4026	New Bedford district (Fort Rodman).....	New Bedford, Mass.....	67,000
			12,369,850

List of projects built by the cantonment and construction divisions, with approximate estimated cost to June 30, 1919—Continued.

Symbol No.	Name.	Location.	Approximate estimated cost.
POSTS, PERMANENT, ARMY—continued.			
<i>Disciplinary barracks.</i>			
3001	Alcatraz (Pacific Branch).....	Alcatraz Island, Calif.....	\$61,000
19	Fort Leavenworth.....	Fort Leavenworth, Kans.....	(7)
275	Fort Jay (Atlantic Branch).....	Governors Island, N. Y.....	2,100
			63,100
<i>Interior.</i>			
3002	Apache.....	Arizona.....	68,700
7076	Ancon.....	Canal Zone.....	37,500
3004	Armstrong.....	Hawaiian Islands.....	26,600
3005	Benjamin Harrison.....	Indiana.....	2,737,000
75	Bliss.....	Texas.....	(8)
3007	Brady.....	Michigan.....	1,400
3009	Clark.....	Texas.....	(9)
3014	Crook.....	Nebraska.....	37,500
3016	D. A. Russell.....	Wyoming.....	415
16	Des Moines.....	Iowa.....	(10)
3020	Douglas.....	Utah.....	(11)
3025	Ethan Allen.....	Vermont.....	7,400
3027	Gibbons.....	Alaska.....	25,000
3056	Huachuca.....	Arizona.....	(12)
3096	Jay.....	New York.....	230,000
7008	Kamehameha.....	Hawaiian Islands.....	13,000
19	Leavenworth.....	Kansas.....	1,082,000
3039	Liscom.....	Alaska.....	8,000
3042	Logan H. Roots.....	Arkansas.....	(13)
3047	McIntosh.....	Texas.....	(14)
66	McPherson.....	Georgia.....	900,000
3044	Madison Barracks.....	New York.....	(15)
3053	Myer.....	Virginia.....	150,000
3055	Niagara.....	New York.....	60,000
3089	Omaha.....	Nebraska.....	10,000
62	Oglethorpe.....	Georgia.....	5,500,000
140	Ontario.....	New York.....	(16)
3094	Plattsburg Barracks.....	do.....	(17)
3095	Porter.....	do.....	(18)
3092	Presidio of San Francisco.....	California.....	68,000
67	Riley.....	Kansas.....	840,000
3063	Ringgold.....	Texas.....	(19)
3097	Ruger.....	Hawaiian Islands.....	100
3073	St. Michael.....	Alaska.....	2,000
3053	Sam Houston.....	Texas.....	630,000
3075	Schofield Barracks.....	Hawaiian Islands.....	4,000
3076	Shafter.....	do.....	14,300
3091	Sheridan.....	Illinois.....	(20)
3072	Sill.....	Oklahoma.....	1,562,000
3093	Slocum.....	New York.....	71,500
3074	Snelling.....	Minnesota.....	(21)
3081	Thomas.....	Kentucky.....	17,500
29	Vancouver Barracks.....	Washington.....	318,000
174	War College.....	Washington, D. C.....	133,500
6005	Washington Barracks.....	do.....	43,300
3085	Whipple Barracks.....	Arizona.....	(22)
3087	Wm. H. Seward.....	Alaska.....	2,500
			14,601,215
Total.....			27,034,165

7 Included in No. 19, "Interior posts."

8 Included in No. 75, "Mexican border."

9 Included in No. 3009, "Mexican border."

10 Included in No. 16, "Medical Corps."

11 Included in No. 3020, "Medical Corps."

12 Included in No. 3056, "Mexican border."

13 Included in No. 3042, "Medical Corps."

14 Included in No. 3047, "Mexican border."

15 Included in No. 3044, "Medical Corps."

16 Included in No. 140, "Medical Corps."

17 Included in No. 3094, "Medical Corps."

18 Included in No. 3095, "Medical Corps."

19 Included in No. 3063, "Mexican border."

20 Included in No. 3091, "Medical Corps."

21 Included in No. 3074, "Medical Corps."

22 Included in No. 3085, "Medical Corps."

List of projects built by the cantonment and construction divisions, with approximate estimated cost to June 30, 1919—Continued.

Symbol No.	Name.	Location.	Approximate estimated cost.
RECRUIT DEPOTS.			
3010	Columbus Barracks.....	Columbus, Ohio.....	\$44,000
99	Jefferson Barracks.....	St. Louis, Mo.....	590,000
3043	Logan.....	Denver, Colo.....	2,000
2090	McDowell.....	San Francisco, Calif.....	(23)
	Total.....		636,000
REMOUNT DEPOTS.			
3026	Front Royal.....	Front Royal, Va.....	4,200
3036	Keogh.....	Fort Keogh, Mont.....	65,000
3062	Reno.....	Oklahoma.....	8,600
	Total.....		77,800
WAR PRISONS.			
3020	Fort Douglas.....	Fort Douglas, Utah.....	(24)
19	Fort Leavenworth.....	Fort Leavenworth, Kans.....	(17)
66	Fort McPherson, No. 1.....	Atlanta, Ga.....	(25)
62	Fort Oglethorpe.....	Fort Oglethorpe, Ga.....	(26)
QUARTERMASTER CORPS.			
<i>Camps.</i>			
6006	Johnston.....	Jacksonville, Fla.....	6,100,000
6012	Meigs.....	Washington, D. C.....	625,000
			6,725,000
<i>Army supply bases.</i>			
97	Boston.....	Boston, Mass.....	† 26,000,000
117	Brooklyn.....	Brooklyn, N. Y.....	† 32,500,000
152	New Orleans.....	New Orleans, La.....	† 12,800,000
27	Norfolk.....	Norfolk, Va.....	† 29,000,000
			100,300,000
<i>Expeditionary depots.</i>			
11	Baltimore.....	Baltimore, Md.....	1,807,300
17	Philadelphia.....	Philadelphia, Pa.....	939,000
40	Hoboken (Army Transport Service).....	Hoboken, N. J.....	880,000
43	Governors Island.....	New York, N. Y.....	1,780,000
			5,406,300
<i>General depots.</i>			
7004	Atlanta.....	Atlanta, Ga.....	176,000
7005	Boston.....	Boston, Mass.....	11,300
149	Boston terminal warehouse.....	do.....	1,263,000
54	Bush terminal warehouse.....	Brooklyn, N. Y.....	640,000
165	Cold-storage warehouse.....	Chicago, Ill.....	† 3,200,000
7013	Omaha Ordnance Depot, No. 24.....	Omaha, Nebr.....	250
63	Permanent depot warehouse.....	Chicago, Ill.....	† 3,387,800
124	Springfield (joint Quartermaster and Ordnance).....	Springfield, Mass.....	80,000
7038	Motor storage depot.....	Detroit, Mich.....	22,000
			8,780,350
<i>Interior storage depots.</i>			
18	Chicago.....	Chicago, Ill.....	765,000
100	Columbus.....	Columbus, Ohio.....	† 5,270,000
53	Jeffersonville.....	Jeffersonville, Ind.....	1,710,000
102	New Cumberland.....	New Cumberland, Pa.....	† 4,528,300
15	Philadelphia.....	Philadelphia, Pa.....	3,060,000
21	Pittsburgh.....	Pittsburgh, Pa.....	666,000
101	Schenectady.....	Schenectady, N. Y.....	† 4,765,000
20	St. Louis.....	St. Louis, Mo.....	1,380,400
			22,145,300

²³ Included in No. 4004, "Coast defense."

²⁴ Included in No. 3030, "Medical Corps."

¹⁷ Included in No. 3094, "Medical Corps."

²⁵ Included in No. 66, "Interior posts."

²⁶ Included in No. 62, "Interior posts."

List of projects built by the cantonment and construction divisions, with approximate estimated cost to June 30, 1919—Continued.

Symbol No.	Name.	Location.	Approximate estimated cost.
QUARTERMASTER CORPS—continued.			
<i>Terminals.</i>			
123	Charleston (joint Quartermaster and Ordnance).....	Charleston, S. C.....	† \$10,850,000
150	Philadelphia.....	Philadelphia, Pa.....	† 13,325,000
1	Port Newark.....	Newark, N. J.....	† 16,075,000
			40,250,000
<i>Building alterations.</i>			
7015	O'Neil Adams Building.....	New York, N. Y.....	2,000
7034	45 Broadway.....	do.....	40,000
			42,000
Total.....			183,648,950
SIGNAL CORPS.			
<i>Camps.</i>			
2011	Benjamin Franklin.....	Admiral, Md.....	(²⁷)
<i>Depots and warehouses.</i>			
223	General supply.....	San Antonio, Tex.....	3,500
7027	Fort Wood.....	Bedloes Island, N. Y.....	380,000
44	Fort Sam Houston.....	San Antonio, Tex.....	3,500
Total.....			387,000
TANK CORPS.			
<i>Camps.</i>			
6013	Colt.....	Gettysburg, Pa.....	414,500
6020	Polk.....	Raleigh, N. C.....	905,000
Total.....			1,319,500
TREASURY DEPARTMENT (PUBLIC-HEALTH SERVICE).			
<i>Quarantine stations.</i>			
281	Cape Charles.....	Cape Charles, Va.....	225,000
278	Reedy Island.....	Reedy Island, Del.....	84,500
289	Savannah.....	Savannah, Ga.....	100,000
Total.....			409,500

²⁷ Included in No. 2011, "National Army."

EXHIBIT No. 2.

[War Department, Construction Division, U. S. A. 4th Ed.—10M 6-18.]

Contract for Emergency Work.

Contract made and concluded this day of, 191.., by and between, a corporation organized under the laws of the State of, represented by, its, party of the first part (hereinafter called Contractor), and the

UNITED STATES OF AMERICA,

By (hereinafter called Contracting Officer), acting by authority of the Secretary of War, party of the second part.

Whereas, the Congress having declared by Joint Resolution approved April 6, 1917, that war exists between the United States of America and Germany, a national

emergency exists and the United States urgently requires the immediate performance of the work hereinafter described, and it is necessary that said work shall be completed within the shortest possible time; and

Whereas, it is advisable, under the disturbed conditions which exist in the contracting industry throughout the country, for the United States to depart from the usual procedure in the matter of letting contracts, and adopt means that will insure the most expeditious results; and

Whereas, the Contractor has had experience in the execution of similar work, has an organization suitable for the performance of such work, and is ready to undertake the same upon the terms and conditions herein provided; and

Whereas, it is not practicable to do the work hereinafter provided on or under any form of contract other than that which hereinafter follows, nor will circumstances permit the delay in letting this contract until at least three responsible competing contractors shall have been notified and considered in connection with such contract and the awarding of the contract to the lowest bidder.

Now, therefore, this contract witnesseth, That in consideration of the premises and of the payments to be made as hereinafter provided, the Contractor hereby covenants and agrees to and with the Contracting Officer as follows:

ARTICLE I.

Extent of the work.—The Contractor shall, in the shortest possible time, furnish the labor, material, tools, machinery, equipment, facilities, and supplies, and do all things necessary for the construction and completion of the following work:

.....

 in accordance with the drawings and specifications to be furnished by the Contracting Officer, and subject in every detail to his supervision, direction, and instruction.

The Contracting Officer may, from time to time, by written instructions or drawings issued to the Contractor, make changes in said drawings and specifications, issue additional instructions, require additional work, or direct the omission of work previously ordered, and the provisions of this contract shall apply to all such changes, modifications, and additions with the same effect as if they were embodied in the original drawings and specifications. The Contractor shall comply with all such written instructions or drawings.

The title to all work completed or in course of construction shall be in the United States; and upon delivery at the site of the work, and upon inspection and acceptance in writing by the Contracting Officer, all machinery, equipment, hand tools, supplies, and materials, for which the Contractor shall be entitled to be reimbursed under paragraph (a) of Article II hereof, shall become the property of the United States. These provisions as to title shall not operate to relieve the Contractor from any duties imposed hereby or by the Contracting Officer.

ARTICLE II.

Cost of the work.—The Contractor shall be reimbursed in the manner hereinafter described for such of its actual net expenditures in the performance of said work as may be approved or ratified by the Contracting Officer and as are included in the following items:

(a) All labor, material, machinery, hand tools not owned by the workmen, supplies and equipment, necessary for either temporary or permanent use for the benefit of said work; but this shall not be construed to cover machinery or equipment mentioned in section (c) of this Article. The Contractor shall make no departure from the standard rate of wages being paid in the locality where said work is being done, without the prior consent and approval of the Contracting Officer.

(b) All sub-contracts made in accordance with the provisions of this agreement.

(c) Rental actually paid by the Contractor, at rates not to exceed those mentioned in the schedule of rental rates hereto attached, for construction plant in sound and workable condition, such as pumps, derricks, concrete mixers, boilers, clam-shell or other buckets, electric motors, electric drills, electric hammers, electric hoists, steam shovels, locomotive cranes, power saws, engineers' levels and transits, and such other equipment as may be necessary for the proper and economical prosecution of the work.

Rental to the Contractor for such construction plant or parts thereof as it may own and furnish, at the rates mentioned in the schedule of rental rates hereto attached, except as hereinafter set forth. When such construction plant or any part thereof shall arrive at the site of the work, the Contractor shall file with the Contracting Officer a schedule setting forth the fair valuation at that time of each part of such construction plant. Such valuation shall be deemed final, unless the Contracting Officer shall, within five days after the machinery has been set up and is working modify or change such valuation, in which event the valuation so made by the Contracting Officer shall be deemed final. When and if the total rental paid to the Contractor for any such part shall equal the valuation thereof, no further rental therefor shall be paid to the Contractor, and title thereto shall vest in the United States. At the completion of the work, the Contracting Officer may at his option purchase for the United States any part of such construction plant then owned by the Contractor by paying to the Contractor the difference between the valuation of such part or parts and the total rentals theretofore paid therefor.

Rates of rental as substitutes for such scheduled rental rates may be agreed upon in writing between the Contractor and the Contracting Officer, such rates to be in conformity with rates of rental charged in the particular territory in which the work covered by this contract is to be performed. If the Contracting Officer shall furnish or supply any such equipment, the Contractor shall not be allowed any rental therefor and shall receive no fee for the use of such equipment.

(d) Loading and unloading such construction plant, the transportation thereof to and from the place or places where it is to be used in connection with said work, subject to the provisions hereinafter set forth, the installation and dismantling thereof, and ordinary repairs and replacements during its use in the said work.

(e) Transportation and expenses to and from the work of the necessary field forces for the economical and successful prosecution of the work, procuring labor and expediting the production and transportation of material and equipment.

(f) Salaries of resident engineers, superintendents, timekeepers, foremen, and other employees at the field offices of the Contractor in connection with said work. In case the full time of any field employee of the Contractor is not applied to said work but is divided between said work and other work, his salary shall be included in this item only in proportion to the actual time applied to this work.

(g) Buildings and equipment required for necessary field offices, commissary, and hospital and the cost of maintaining and operating said offices, commissary, and hospital, including such minor expenses as telegrams, telephone service, expressage, postage, etc.

(h) Such bonds, fire, public liability, employers' liability, workmen's compensation and other insurance as the Contracting Officer may approve or require and such losses and expenses, not compensated by insurance or otherwise, as are found and certified by the Contracting Officer to have been actually sustained (including settlements made with the written consent and approval of the Contracting Officer) by the contractor in connection with said work, and to have clearly resulted from causes other than the fault or neglect of the Contractor. Such losses and expenses shall not be included in the cost of the work for the purpose of determining the Contractor's fee. The cost of reconstructing and replacing any of the work destroyed or damaged shall be included in the cost of the work for the purpose of reimbursement to the Con-

tractor, but not for the purpose of determining the Contractor's fee, except as herein-after provided.

(i) Permit fees, deposits, royalties, and other similar items of expense incidental to the execution of this contract, and necessarily incurred. Expenditures under this item must be approved in advance by the Contracting Officer.

(j) Such proportion of the transportation, traveling, and hotel expenses of officers, engineers and other employees of the Contractor as is actually incurred in connection with this work.

(k) Such other items as should in the opinion of the Contracting Officer be included in the cost of the work. When such an item is allowed by the Contracting Officer, it shall be specifically certified as being allowed under this paragraph.

The United States reserves the right to pay directly to common carriers any or all freight charges on material of all kinds, and machinery, furnished under this contract, and certified by the Contracting Officer as being for installation or for consumption in the course of the work hereunder; the Contractor shall be reimbursed for such freight charges of this character as it shall pay and as shall be specifically certified by the Contracting Officer; but the Contractor shall have no fee based on such expenditures. Freight charges paid by the Contractor for transportation of construction equipment, construction plant, tools and supplies of every character shall be treated as part of the cost of the work upon which the Contractor's fee shall be based; provided that charges for transportation of such construction equipment, construction plant and tools over distances in excess of five hundred miles shall require the special approval of the Contracting Officer.

No salaries of the Contractor's executive officers, no part of the expense incurred in conducting the Contractor's main office, or regularly established branch office, and no overhead expenses of any kind, except as specifically listed above, shall be included in the cost of the work; nor shall any interest on capital employed or on borrowed money be included in the cost of the work.

The Contractor shall take advantage to the extent of its ability of all discounts available, and when unable to take such advantage shall promptly notify the Contracting Officer of its inability and its reasons therefor.

All revenue from the operations of the commissary, hospital or other facilities, or from rebates, refunds, etc., shall be accounted for by the Contractor and applied in reduction of the cost of the work.

ARTICLE III.

Determination of fee.—As full compensation for the services of the Contractor, including profit and all general overhead expense, except as herein specifically provided, the Contracting Officer shall pay to the Contractor in the manner herein-after prescribed a fee to be determined at the time of completion of the work from the following schedule, except as hereinafter otherwise provided:

If the cost of the work is \$100,000 or under, a fee of 7 per cent of such cost.

If the cost of the work is over \$100,000 and under \$125,000, a fee of \$7,000.

If the cost of the work is over \$125,000 and under \$450,000, a fee of 6½ per cent.

If the cost of the work is over \$450,000 and under \$500,000, a fee of \$29,250.

If the cost of the work is over \$500,000 and under \$1,000,000 a fee of 6 per cent.

If the cost of the work is over \$1,000,000 and under \$1,100,000, a fee of \$60,000.

If the cost of the work is over \$1,100,000 and under \$1,500,000, a fee of 5½ per cent.

If the cost of the work is over \$1,500,000 and under \$1,650,000, a fee of \$82,500.

If the cost of the work is over \$1,650,000 and under \$2,200,000, a fee of 5 per cent.

If the cost of the work is over \$2,200,000 and under \$2,450,000, a fee of \$110,000.

If the cost of the work is over \$2,450,000 and under \$2,850,000, a fee of 4½ per cent.

If the cost of the work is over \$2,850,000 and under \$3,250,000, a fee of \$128,250.

If the cost of the work is over \$3,250,000 and under \$4,000,000, a fee of 4 per cent.

If the cost of the work is over \$4,000,000 and under \$4,250,000, a fee of \$160,000.
 If the cost of the work is over \$4,250,000 and under \$4,775,000, a fee of $3\frac{1}{2}$ per cent.
 If the cost of the work is over \$4,775,000 and under \$5,175,000, a fee of \$179,062.50.
 If the cost of the work is over \$5,175,000 and under \$5,725,000, a fee of $3\frac{1}{2}$ per cent.
 If the cost of the work is over \$5,725,000 and under \$6,225,000, a fee of \$200,375.
 If the cost of the work is over \$6,225,000 and under \$6,825,000, a fee of $3\frac{1}{2}$ per cent.
 If the cost of the work is over \$6,825,000 and under \$7,400,000, a fee of \$221,812.50.
 If the cost of the work is over \$7,400,000 and under \$7,750,000, a fee of 3 per cent.
 If the cost of the work is over \$7,750,000 and under \$8,350,000, a fee of \$235,500.
 If the cost of the work is over \$8,350,000 and under \$8,800,000, a fee of $2\frac{1}{2}$ per cent.
 If the cost of the work is over \$8,800,000 and under \$9,650,000, a fee of \$242,000.
 If the cost of the work is over \$9,650,000 and under \$10,000,000, a fee of $2\frac{1}{2}$ per cent.
 If the cost of the work is over \$10,000,000, a fee of \$250,000.

Provided, however, that the fee upon such part of the cost of the work as is represented by payments to sub-contractors, under subdivision (b) of Article II hereof, shall in each of the above contingencies be two and one-half per cent ($2\frac{1}{2}\%$) and no more of the amount of such part of the cost.

The cost of materials purchased or furnished by the Contracting Officer for said work, exclusive of all freight charges thereon, shall be included in the cost of the work for the purpose of reckoning such fee to the Contractor, but for no other purpose.

The fee for reconstructing and replacing any of the work destroyed or damaged shall be such percentage of the cost hereof—not exceeding seven per cent (7%)—as the Contracting Officer may determine.

The total fee to the Contractor hereunder shall in no event exceed the sum of Dollars, anything in this agreement to the contrary notwithstanding.

ARTICLE IV.

Payments.—On or about the seventh day of each month the Contracting Officer and the Contractor shall prepare a statement showing as completely as possible: (1) the cost of the work up to and including the last day of the previous month, (2) the cost of the materials furnished by the Contracting Officer up to and including such last day, and (3) an amount equal to two and one-half per cent ($2\frac{1}{2}\%$), except as herein otherwise provided, of the sum of (1) and (2) on account of the Contractor's fee; and the Contractor at such time shall deliver to the Contracting Officer original signed pay rolls for labor, original invoices for materials purchased, and all other original papers not theretofore delivered supporting expenditures claimed by the Contractor to be included in the cost of the work. If there be any item or items entering into such statement upon which the Contractor and the Contracting Officer cannot agree, the decision of the Contracting Officer as to such disputed item or items shall govern. The Contracting Officer shall then pay to the Contractor on or about the ninth day of each month the cost of the work mentioned in (1) and the fee mentioned in (3) of such statement, less all previous payments. When the statement above mentioned includes any work of reconstructing and replacing work destroyed or damaged, the payment on account of the fee in (3) for such reconstruction and replacement work shall be computed at such rate, not exceeding two and one-half per cent ($2\frac{1}{2}\%$), as the Contracting Officer may determine. The statement so made and all payments made thereon shall be final and binding upon both parties hereto, except as provided in Article XIV hereof. The Contracting Officer may also make payments at more frequent intervals for the purpose of enabling the Contractor to take advantage of discounts at intervals between the dates above mentioned or for other lawful purposes. Upon final completion of said work the Contracting Officer shall pay to the Contractor the unpaid balance of the cost of the work and of the fee as determined under Articles II and III hereof.

ARTICLE V.

Inspection and audit.—The Contracting Officer shall at all times be afforded proper facilities for inspection of the work and shall at all times have access to the premises, to the work and material, and to all books, records, correspondence, instructions, plans, drawings, receipts, vouchers, and memoranda of every description of the Contractor pertaining to said work; and the Contractor shall preserve for a period of two years after its completion or cessation of work under this contract, all the books, records and other papers just mentioned. Any duly authorized representative of the Contractor shall be accorded the privilege of examining the books, records, and papers of the Contracting Officer relating to said work for the purpose of checking up and verifying the cost of said work. The system of accounting to be employed by the Contractor shall be such as is satisfactory to the Contracting Officer.

If at any time the Contracting Officer shall find that bills for labor, material, or other bills legitimately incurred by the Contractor hereunder, are not promptly paid by the Contractor, the Contracting Officer may, in his discretion, refuse to make further payments to the Contractor until all such obligations past due shall have been paid. Should the Contractor neglect or refuse to pay such bills within five days after notice from the Contracting Officer so to do, then the Contracting Officer shall have the right to pay such bills directly, in which event such direct payment shall not be included in the cost of the work.

ARTICLE VI.

Special requirements.—The Contractor hereby agrees that it will:

(a) Begin the work herein specified at the earliest time practicable, and diligently proceed so that such work may be completed at the earliest possible date.

(b) Promptly pay for all labor, material or other service rendered.

(c) Procure and thereafter maintain such insurance in such forms and in such amounts and for such periods of time as the Contracting Officer may approve or require.

(d) Procure all necessary permits and licenses, and obey and abide by all laws, regulations, ordinances, and other rules applying to such work, of the United States of America, of the State or Territory wherein such work is done, of any subdivision thereof, or of any duly constituted public authority.

(e) Unless this provision is waived by the Contracting Officer, insert in every contract made by it for the furnishing to it of services, materials, supplies, machinery and equipment, or the use thereof, for the purposes of the work hereunder, a provision that such contract is assignable to the United States; will make all such contracts in its own name, and will not bind or purport to bind the United States or the Contracting Officer thereunder.

(f) In every sub-contract made in accordance with the provisions hereof, require the sub-contractor to agree to comply fully with all the undertakings and obligations of the Contractor herein, excepting such as do not apply to such sub-contractor's work.

(g) At all times keep at the site of the work a duly appointed representative who shall receive and execute on the part of the Contractor such notices, directions and instructions as the Contracting Officer may desire to give.

(h) At all times use its best efforts in all its acts hereunder to protect and subserve the interest of the Contracting Officer and the United States.

ARTICLE VII.

Right to terminate contract.—Should the Contractor at any time refuse, neglect, or fail in any respect to prosecute the work with promptness and diligence, or default in the performance of any of the agreements herein contained, the Contracting Officer

may, at his option, after five days written notice to the Contractor, terminate this contract, and may enter upon the premises and take possession, for the purpose of completing said work, of all materials, tools, equipment, and appliances, and all options, privileges and rights, and may complete, or employ any other person or persons to complete said work. In case of such termination of the contract, the Contracting Officer shall pay to the Contractor such amounts of money on account of the unpaid balance of the cost of the work and of the fee as will result in fully reimbursing the Contractor for the cost of the work up to the time of such termination, plus a fee computed thereon at the rate or rates for monthly payments set forth in Article IV hereof; and the Contracting Officer shall also pay to the Contractor compensation, either by purchase or rental, at the election of the Contracting Officer, for any equipment retained; such compensation, in the event of rental, to be in accordance with paragraph (c) of Article II, and in the event of purchase to be based upon the valuation determined by the Contracting Officer as of the time of his taking such possession. The Contractor hereby agrees that such payments when made shall constitute full settlement of all claims of the Contractor against the Contracting Officer and the United States or either of them for money claimed to be due to the Contractor for any reason whatsoever. In case of such termination of the contract the Contracting Officer shall further assume and become liable for all such obligations, commitments, and unliquidated claims as the Contractor may have theretofore in good faith undertaken or incurred in connection with said work, and the Contractor shall, as a condition of receiving the payments mentioned in this article, execute and deliver all such papers, and take all such steps as the Contracting Officer may require for the purpose of fully vesting in him the rights and benefits of the Contractor under such obligations or commitments. When the Contracting Officer shall have performed the duties incumbent upon him under the provisions of this article, the Contracting Officer shall thereafter be entirely released and discharged of and from any and all demands, actions, or claims of any kind on the part of the Contractor hereunder or on account hereof.

ARTICLE VIII.

Abandonment of work by contracting officer.—If conditions should arise which in the opinion of the Contracting Officer make it advisable or necessary to cease work under this contract, the Contracting Officer may abandon the work and terminate this contract. In such case the Contracting Officer shall assume and become liable for all such obligations, commitments and unliquidated claims as the Contractor may have theretofore, in good faith, undertaken or incurred in connection with said work; and the Contractor shall, as a condition of receiving the payments mentioned in this article execute and deliver all such papers, and take all such steps as the Contracting Officer may require for the purpose of fully vesting in him the rights and benefits of the Contractor under such obligations or commitments. The Contracting Officer shall pay to the Contractor such an amount of money on account of the unpaid balance of the cost of the work and of the fee as will result in the Contractor receiving full reimbursement for the cost of the work up to the time of such abandonment, plus a fee to be computed in the following manner: To the cost of the work up to the time of such abandonment shall be added the amount of the contractual obligations or commitments assumed by the Contracting Officer, and such total shall be treated as the cost of the work, upon which the fee shall be computed in accordance with the provisions of Article III hereof. When the Contracting Officer shall have performed the duties incumbent upon him under the provisions of this Article, the Contracting Officer and the United States shall thereafter be entirely released and discharged of and from any and all demands, actions or claims of any kind on the part of the Contractor hereunder or on account hereof.

ARTICLE IX.

Bond.—The Contractor shall prior to commencing the said work furnish a bond, with sureties satisfactory to the Contracting Officer, in the sum of Dollars, conditioned upon its full and faithful performance of all the terms, conditions and provisions of this contract, and upon its prompt payment of all bills for labor, material, or other service furnished to the Contractor.

ARTICLE X.

Convict labor.—No person or persons shall be employed in the performance of this contract who are undergoing sentence of imprisonment at hard labor imposed by the courts of any of the several States, Territories, or municipalities having criminal jurisdiction.

ARTICLE XI.

Hours and conditions of labor.—No laborer or mechanic doing any part of the work contemplated by this contract, in the employ of the Contractor or any sub-contractor contracting for any part of said work contemplated, shall be required or permitted to work more than eight (8) hours in any one calendar day upon such work, such prohibition being in accordance with the Act approved June 19, 1912, limiting the hours of daily service of mechanics and laborers on work under contracts to which the United States is a party. For each violation of the requirements of this Article a penalty of Five Dollars (\$5.00) shall be imposed upon the Contractor for each laborer or mechanic for every calendar day in which said employee is required or permitted to labor more than eight (8) hours upon said work, and all penalties thus imposed shall be withheld for the use and benefit of the United States; Provided, that this paragraph shall not be enforced nor shall any penalty be exacted in case such violation shall occur while there is in effect any valid Executive Order suspending the provisions of said Act approved June 19, 1912, or waiving the provisions and stipulations thereof with respect to either this contract or any class of contracts in which this contract shall be included, or when the violation shall be due to any extraordinary events or conditions of manufacture, or to any emergency caused by fire, famine, or flood, by danger to life or property, or by other extraordinary events or conditions on account of which, by subsequent Executive Order, such past violation shall have been excused.

In the event of any dispute with reference to wages, hours, or other conditions appertaining to said work, between the Contractor or any sub-contractor and labor employed by him on said work, the Contractor or sub-contractor shall immediately notify the Contracting Officer of the existence of such dispute and the reasons therefor. The Contracting Officer may, at his option, instruct the Contractor or sub-contractor involved in such dispute as to the method or steps which the Contractor or sub-contractor should follow with reference thereto, and the Contractor or sub-contractor shall thereupon comply with such instructions.

ARTICLE XII.

Right to transfer or sublet.—Neither this contract, nor any interest therein, shall be assigned or transferred. The Contractor shall not enter into any sub-contract for any part of the work herein specified without the consent and approval in writing of the Contracting Officer. In case of such assignment, transfer, or sub-letting without the consent and approval, in writing, of the Contracting Officer, the Contracting Officer may refuse to carry out this contract either with the transferor or transferee, but all rights of action for any breach of this contract by the Contractor are reserved to the United States.

ARTICLE XIII.

No participation in profits by Government officials.—No member of, or delegate to, Congress, or Resident Commissioner, ~~nor any other person belonging to or employed in the military service of the United States~~, is or shall be admitted to any share or part of this contract, or to any benefit that may arise therefrom, but this Article shall not apply to this contract so far as it may be within the operation or exception of Section 116 of the Act of Congress approved March 4, 1909 (35 Stats., 1109).

ARTICLE XIV.

Settlement of disputes.—This contract shall be interpreted as a whole and the intent of the whole instrument, rather than the interpretation of any special clause, shall govern. If any doubts or disputes shall arise as to the meaning or interpretation of anything in this contract, or if the Contractor shall consider itself prejudiced by any decision of the Contracting Officer made under the provisions of Article IV hereof, the matter shall be referred to the Officer in charge of the Construction Division of the Army for determination. If, however, the Contractor shall feel aggrieved by the decision of that officer, it shall have the right to submit the same to the Secretary of War, whose decision shall be final and binding upon both parties hereto.

Covenant against contingent fees.—The Contractor expressly warrants that it has employed no third person to solicit or obtain this Contract in its behalf, or to cause or procure the same to be obtained upon compensation in any way contingent, in whole or in part, upon such procurement; and that it has not paid, or promised or agreed to pay, to any third person, in consideration of such procurement, or in compensation for service in connection therewith, any brokerage, commission, or percentage upon the amount receivable by it hereunder; and that it has not, in estimating the contract price or compensation demanded by it, included any sum by reason of any such brokerage, commission, or percentage; and that all moneys payable to it hereunder are free from obligation to any other person for services rendered, or supposed to have been rendered, in the procurement of this Contract. The Contractor further agrees that any breach of this warranty shall constitute adequate cause for the annulment of this Contract by the United States, and that the United States may retain to its own use from any sums due or to become due hereunder an amount equal to any brokerage, commission, or percentage so paid or agreed to be paid.

[NOTE.—Prescribed by Executive direction. See letter of June 18, 1918, from Attorney General to Secretary of War.]

ARTICLE XV.

This contract shall bind and inure to the Contractor and its successors.

It is understood and agreed that wherever the words "Contracting Officer" are used herein, the same shall be construed to include his successor in office, any other person to whom the duties of the Contracting Officer may be assigned by the Secretary of War, and any duly appointed representative of the Contracting Officer.

Witness the hands of the parties hereto the day and year first above written, all in triplicate.

Witnesses:

(1)

By

(2)

Witnesses:

(1)

UNITED STATES OF AMERICA,

(2)

By

Contracting Officer.

[Modification of Article XIII made in accordance with Army Regulations, Par. 521, C. A. R. No. 59, August 10, 1917.]

SCHEDULE OF RENTAL RATES.

(The rates mentioned are per day.)

The following ranges of rental rates are shown only as an indication of what may be allowed. Rentals will be fixed by Contracting Officer, who will take into consideration sizes, capacities, conditions, and fair market valuations of equipment. Rentals for equipment not shown on list following will be fixed as provided in last paragraph of Section (c) of Article II hereof.

Automobiles.....	\$2.00 to \$8.00	
Adding and listing machines and typewriters.....	.25	.50
Buckets, tippie, bottom dump, orange-peel, clam-shell, etc.....	.50	2.00
Boring machines, power driven.....	.20	.75
Back fillers, power driven.....	2.50	10.00
Block machines, concrete.....		
Boilers, upright and horizontal.....	1.50	6.00
Cars, steel or wooden, contractors'.....	.40	2.00
Crushers, stone.....		
Compressors.....	1.50	8.00
Derricks, with or without power.....	.50	20.00
Dirt spreaders.....	2.00	15.00
Diving outfits complete.....		
Engines, skeleton, with or without slewing gears.....	2.00	5.00
Engines, traction.....	2.00	15.00
Hammers, rivetting.....		
Instruments, engineering.....	.25	1.00
Locomotives, narrow or standard gauge.....	5.00	25.00
Mixers, with or without power, equipped with loaders or not.....	1.00	8.00
Motorcycles.....	.25	1.00
Motors, electric.....	.25	8.00
Pumps, with or without power.....	.50	6.00
Pipe machines, with or without power.....	.50	6.00
Pile drivers, drop, steam-hammer or jet, with or without power....	.50	25.00
Plows, not car unloaders.....	.25	1.00
Rail, per ton.....		
Rollers, horse or power.....	.50	15.00
Scrapers, slip or wheel.....	.25	1.00
Saws, power.....	.25	5.00
Steam shovels.....	10.00	30.00
Skips, steel or wooden.....	.10	1.00
Trench diggers.....	10.00	30.00
Trucks, motor.....	1.00	25.00
Wagons.....	.25	1.00

Fuel, lubricants, and labor not included in the above.

AFFIDAVIT OF CONTRACTING OFFICER.

(To be made only on copy for the Returns Office.)

I do solemnly swear that the foregoing is an exact copy of a contract made by me personally with.....;

that I made the same fairly, without any benefit or advantage to myself, or allowing any such benefit or advantage corruptly to the said.....

or any other person; and that the papers accompanying include all those relating to the said contract, as required by the statute in such case made and provided.

Subscribed and sworn to before me this.....day of....., 191..

[SEAL.]

Notary Public.

EXHIBIT No. 3.

MARCH 15, 1918.

Lieut. Col. R. C. MARSHALL,
Quartermaster Corps, N. A.,
in charge of Cantonment Division.

SIR: The committee invited to advise in regard to methods of executing construction work under the direction of the Cantonment Division begs to report as follows:

The committee has not felt that a study of the details as to form and content of the contract form proposed is embraced in the scope of the invitation presented, and it has therefore limited its consideration to the purchase and hire method and to the various schemes of contractual relations which might be established for emergency construction work between the Government on the one hand and the constructing agencies on the other.

Broadly speaking, there is but one alternative to the usual method of executing work through the process of letting it under some one of the various forms of contract, and that is by purchase and hire, which means in effect the forming of the operating organization, the purchasing of all material and the hiring of all labor by the Government itself. The main objections to this method may be summarized as follows:

The most vital prerequisite to the successful and speedy prosecution of emergency construction work is an efficient field organization. This takes time and experience to assemble, and such organizations must be tried out to insure efficiency, and it seems apparent that the valuable time lost in such process is an insuperable objection to this method. The committee believes existing contractor's organizations should be maintained and fostered, as they constitute, in the opinion of the committee, important factors in the economic life of the Nation and of exceeding importance to its progress when the war is over. These organizations have been built up through the course of many years, and they should not be disrupted or destroyed if their services may be utilized in the work proposed. Serious embarrassment is likely to arise from placing employees on the construction work under the rules and regulations imposed on all Government employees. The difficulty of adapting such rules and regulations to the character and conditions of the work in the various sections of the country would be a very serious drawback in the judgment of the committee.

The administration of work under this method would create an unwieldy organization in Washington. The vast amount of the work proposed and its varying character and the fact that it is so widely scattered over the country, would make it almost impracticable to attempt to administer it all through a central office, and if it is attempted to decentralize it by transferring final authority to each piece of work it practically becomes an agency contract.

Such a system might be applicable to a project of colossal magnitude under conditions in which time is not of the essence of the contract, and might conceivably be a sheer necessity where sanitation, policing, and other governmental functions could not be adequately provided for in any of the usual contractual forms. The committee, finding none of the conditions which would recommend this method of procedure present in the emergency construction work contemplated, and finding, on the contrary, many serious objections, advises that the "purchase and hire" method be not used.

The committee advises, therefore, that the projected work be executed under some form of contract with existing contracting organizations, and the committee has weighed carefully the advantages and disadvantages of the various methods in common use, with reference to the particular problems presented by the type of projects and the conditions imposed by their emergency nature as well as the abnormal conditions of the labor and material market produced by war conditions.

A few years ago the lump sum contract was the one most commonly employed, and for it were claimed many advantages for both parties thereto which are to-day found

to exist in all the contractual instruments which are equitably drawn. There could be no possible objections to the "lump-sum" contract were the Government dealing with clearly delineated problems to be executed under stable peace conditions always provided that the bidders be selected for their fitness and capabilities to properly perform the work, but the committee finds the following vital defects to which it begs to call your attention:

No steps may be taken until drawing and specifications are complete, the bids taken and the contract awarded, and thus would be lost those precious months which may be measured not in dollars but in lives.

The history of war emergency construction shows the development of many projects originally small by comparison into works of great magnitude and importance, and for such development the "lump sum" plan is too inflexible to operate satisfactorily; administration costs must increase in adjusting important changes, while inequities and dissatisfaction are bound to arise. In such an unstable market as exists costs must be figured by the contractor high enough to provide a margin to cover unforeseen and uncontrollable changes in the prices of material or labor, which would result in a speculative price which would be disadvantageous to the Government.

Your committee advises, therefore, that the "lump-sum" method be not used.

There is a variant to the foregoing which provides for a lump-sum contract to cover the original project, with a cost plus remuneration for changes and extensions, but since the main objections inherent in the straight lump-sum method are present here also, the committee advises that it be not used.

On an emergency contract of indeterminate extent an admirable method in normal times is an agreed fixed price on such units of construction as per yard of concrete in place, per thousand bricks in the wall, etc., but here again the committee finds that existing conditions and the extreme variations in scope of the work rob it of its sole advantage—exact adjustment by final survey. A fairly complete knowledge in advance of the conditions under which concrete is to be poured, and steel fabricated and erected, obviously controls a close estimate for the establishment of equitable unit prices, and so this method acquires many of the objections advanced against the "lump-sum" method. For these reasons the committee advises that the "unit price" method be not used.

One other type of contract should be mentioned before presenting the scheme the committee unanimously advises, and that is the agency form of contract. The agency contract must be founded upon, and its successful use depends upon securing those absolutely essential conditions of mutual trust and confidence which grow alone from long and satisfactory association in the position of owner and contractor; its principal use is confined to undertakings of such magnitude as to be beyond the financial capacities of the strongest contracting organizations and unless contemplated projects embrace work of so extraordinary a character, we deem its use unwise, particularly as an agent could involve the Government in onerous obligations.

Having advised therefore that these various forms be not used, and for the reasons stated, the committee unanimously concurs in advocating what may be termed the cost plus a sliding scale fee scheme of contract for both general contracts and subcontracts. In its general application it enjoys the same confidence in the building world as to the equities as does the lump-sum contract, as is evidenced by its very extensive use. Its essential features are its applicability to projects great and small—its extreme flexibility with automatic adjustment of all variations in plan and scope. Under its terms the rates of pay for labor are known to be more equitable than under other methods—it requires for its successful application a painstaking review of the records, and standing of contractors just as is now made under existing methods, to insure the selection of an organization which measures up to the requirements of the contemplated project but without working any hardship, since no one can escape the axiom that in the final analysis each job can go only to one contractor. The com-

mittee believes that one of the objections charged to this form of contract is that it encourages extravagance and holds open temptations to increase costs because such increase is accompanied by increased compensation. The general form of contract now in use by the Cantonment Division, in which the percentage decreases as the cost increases and is broken by fixed fees at intervals, seems calculated to effectually check, if not prevent, this tendency. Moreover, under the contract proposed the Government retains the right to control the prices of most materials and of labor. Under these circumstances it does not seem to the committee that such an objection would have any force in relation to this form of contract. No reasonable objection can be pointed out by anyone possessing a full understanding of its equitable operation in practice, and finally, this scheme appeals to the committee as possessing one qualification which must commend it to all thinking men—it permits starting actual work weeks and even months before the details are completely worked out and delineated and permits the Government to push the job at any speed it may elect, changing at will its plan and scope, but paying only what the work actually costs plus a fee which is so reasonable as to be above the reach of fair-minded criticism.

The committee therefore advises for emergency construction work by the Cantonment Division the scheme of contract known as "cost of the work plus a sliding scale percentage with a maximum upset fee."

Respectfully submitted.

A. N. TALBOT, *Chairman*.
JOHN LAWRENCE MAURAN, *Secretary*.
JOHN R. ALPINE.
FREDERICK L. CRANFORD.
CHARLES T. MAIN.
OSCAR A. REUM.
R. G. RHETT.
E. W. RICE.

EXHIBIT NO. 4.

COUNCIL OF NATIONAL DEFENSE,
Washington, June 19, 1917.

From: Leonard Metcalf, George W. Fuller, A. E. Phillips, and L. B. Stillwell.

To: The Committee on Emergency Construction of Buildings and Engineering Structures.

Subject: Compensation of engineers upon cantonment work.

The agreements for doing engineering or architectural work have been prepared upon the principles underlying the contract for construction work. These principles may be enunciated as follows:

1. The work must at all times be under the superior control of the United States Government, through its duly accredited representatives.
2. Services should be equitably compensated.
3. Government methods of contracting for and compensating construction work and services should be such as to utilize and strengthen, and not to cripple or destroy, existing organizations, as suggested by Mr. Balfour in the light of England's adverse experience, resulting from the building up of new, instead of utilizing live and well-established organizations.

The difficulty of executing works involving the expenditure of such tremendous sums (\$4,000,000 per cantonment) in so brief a time (75 days) is enormous, if not without precedent in this country.

The unsettled conditions induced by war materially augment these difficulties.

The brevity of available time, the urgency of the situation, and the magnitude of the task make it impossible to conform to routine governmental methods, and require that special methods of executing and accounting the work be adopted.

After careful study it is the consensus of opinion that the methods provided in the forms submitted herewith are likely to prove the most effective.

The plans for cantonments prepared at the Washington headquarters are typical and suggestive only, indicating general requirements.

The actual grouping of, and foundations for, buildings; design of water supply; storage and distributing pipe systems; sewerage, sewers and sewage disposal; roads and railroads; and other utilities must be developed upon the ground. Therefore, an engineering staff, competent and adequate to perform this service and to generally supervise construction for the Government, must be provided at each camp.

It is believed that the use of a smaller engineer corps is possible in building the camps by contract upon the proposed basis of actual cost plus percentage, and in view of certain provisions of this contract, than would be required under other methods of contracting for this work.

The engineering work at individual cantonments may be done in one of three ways:

1. By employing existing engineering organizations with competent staff capable of ready expansion, through which all of the engineering services required at the cantonment would be rendered. The head of this organization would become supervising engineer or superintendent of construction acting under the general direction of the constructing quartermaster resident upon the work.

Under this plan, compensation should be based upon the actual cost to said organization of the engineers upon the work, with traveling and other proper expenses, plus a percentage upon the entire cost of the cantonment of three-quarters of 1 per cent.

Under this plan time required for organization would be saved, efficiency increased, and the existing engineering organizations would be strengthened rather than impaired—to the present and future advantage of the country.

This is the plan recommended by the committee as best and cheapest:

2. By the organization of the entire local engineering force de novo, from top to bottom under the immediate supervision, rather than direction, of the constructing quartermaster resident upon the work. The engineers thus drawn to the aid of the constructing quartermaster would then be compensated upon a salary basis, in some cases as Reserve Corps officers.

This method would be a normal one for the Army under normal conditions, giving ample time for such procedure, and would appear to save some overhead cost and profit, but greater hazard, loss of time and efficiency, error in design and construction would be incurred; and organizations would be impaired instead of being strengthened.

It is believed that with work of such magnitude and shortness of time limit, as here prevail, it is not practicable. The work is of too great magnitude for any man to play the joint rôle of administrator and executive, consultant and supervisor. It is wiser to make use, therefore, of organizations or nuclei of engineers, who have worked together heretofore and can, therefore, expedite construction, calling these to the aid of and to work under the direction of the constructing quartermaster.

3. By a combination of methods 1 and 2 suggested above; that is, by the organization of a local engineering force under the direction of the constructing quartermaster supplemented by the employment of existing engineering organizations upon special branches of the work such as water-works, sewerage, site and city planning, etc.

Under this plan compensation would be rendered to the men directly employed, upon a salary basis, in part as officers in the Reserve Corps; and to the engineering organizations, employed upon special problems or branches of the work, upon the basis of salaries paid to employees of the engineering organizations, called to the assistance of the constructing quartermaster, with proper traveling and other expenses, plus a lump sum payment (to cover compensation and overhead costs and engineering equipment), determined by agreement between the constructing quartermaster and the engineering organization in advance of the rendering of the service in view of the comparative simplicity or complexity of the work to be done, and the nature, condition and extent of the work and services desired by the constructing quartermaster.

The lump-sum fee on the waterworks and on sewerage systems should be 2 per cent (each) or more of the estimated cost of these works. If the distribution water pipes or collecting sewers be eliminated from the basis upon which the fee is computed, the fee should be 5 per cent or more of the remaining cost of the waterworks and of the outfall sewers and sewage disposal systems.

4. Consulting engineers employed individually, without their organization, to pass upon important specific problems as advisors to the constructing quartermaster of the supervising engineer; may be paid upon the basis of a lump-sum fee.

We are of the opinion that the work can be completed most promptly and most cheaply by utilizing experienced civilian supervising engineers, and their organizations, in general accord with the methods used in construction work for private account. While greater expense is involved in paying the engineering organization, the saving effected in the gross cost of the work, and in time, much more than offsets this expense.

The third method of organizing the engineering forces, required in the building of the cantonments, may be adopted if the first, which is believed likely to lead to the most rapid and economical construction, is deemed by the department impossible of application.

Some of the more important considerations influencing the lump sum to be paid for engineering services upon the cantonment, in addition to the salaries paid to engineering employees under the third method, discussed above, are as follows:

1. Typical detailed plans of camp with general bills of materials have been prepared at the Washington headquarters.

2. The supervising engineer or superintendent of construction is to adopt the typical plans to the selected site, prepare final plans, specifications so far as required, and bills of materials; furnish lines, bench marks and general grades; determine the location of all buildings and engineering structures; check and inspect materials; and supervise the general construction of the work. In the adapting of the typical detailed plans for locating buildings upon the site, the supervising engineer is to have the aid of a city planner to be designated by the Washington headquarters.

3. The contractor is to furnish necessary labor and materials to build the cantonment; is to furnish to the engineer any labor that may be required, including rodmen, chainmen, axmen, etc., and to lay out his own detailed lines and grades for buildings and connections from the basic lines and bench marks that will be established by the engineer.

4. The accountant is to check and verify all delivery of materials, time accounts, miscellaneous expenditures, and prepare all vouchers and statements.

5. The Washington headquarters, with the aid of the committee on materials of the General Munitions Board of the Council of National Defense, it is understood, is to

determine possible sources of materials and to aid in their delivery to each cantonment site.

6. The rates of compensation established for the engineers do not contemplate any allowance for board except for the consulting engineer. Housing, cots, and blankets are to be provided for the engineering force at the cantonment as soon as practicable after construction begins.

The general range of compensation for engineers is as follows:

Principal assistant engineers, up to \$350 per month.

Assistant engineers and designers, up to \$250 per month.

Instrument men and draftsmen, up to \$175 per month.

Junior draftsmen and secretarial assistants, up to \$125 per month.

Assistants, \$90 per month.

Your attention is called to the facts that the provisions of article 3, above, that the contractor shall furnish rodmen, chainmen, axmen, etc., to the engineer, and of article 4, that the accountant shall check delivery of materials and time accounts, are contrary to usual engineering practice. They have been drawn to meet the expressed wishes of responsible representatives of the department.

Attached hereto are three forms of contract for engineering services, to wit:

1. Contract for consulting engineering services or for engineering services limited to specific problems.
2. Contract for general engineering services for entire construction of cantonment.
3. Contract for general engineering services limited to certain branches of construction of cantonments (such, for instance, as waterworks, sewerage, etc.).

[Form 1—June 18, 1917.]

[Cantonment Construction, Q. M. Corps, U. S. A., 1917.]

Standard Form of Agreement with "Consulting Engineers" on limited specific problems.

CONTRACT FOR CONSULTING ENGINEER'S SERVICES

upon the specific problem of
at cantonment at

This Contract, made and concluded this day of, 1917,
by and between
consulting engineer of
party of the first part (hereinafter called engineer), and the

UNITED STATES OF AMERICA,

by, Constructing Quartermaster, acting by authority of the Secretary of War, party of the second part.

Whereas the Congress having declared by Joint Resolution approved April 6, 1917, that war exists between the United States of America and Germany, a national emergency exists, and the United States urgently requires the immediate performance of the work hereinafter described, and it is necessary that said work shall be completed within the shortest possible time; and

Whereas it is advisable under the disturbed conditions which exist in the engineering field throughout the country for the United States to depart from the usual procedure and adopt means that will insure the most expeditious results; and

Whereas the engineer has had experience in the design and construction of similar work, and is ready to undertake the same upon the terms and conditions herein provided:

Now, therefore, this contract witnesseth, That in consideration of the premises and the payments to be made as hereinafter provided, the consulting engineer hereby covenants and agrees to and with the Constructing Quartermaster as follows:

1. *Nature of service,*

2. *Period of service,*

3. *Fee,*

4. *Reimbursement.*—The United States of America, through the Constructing Quartermaster, is to reimburse the consulting engineer the cost of transportation and living expenses while traveling in connection with and upon the work. The consulting engineer's bill covering reimbursement due him is to be in a form showing the detailed actual expenditures.

5. *Time and terms of payments.*—

Witness the hands of the parties hereto the day and year first above written, all in triplicate.

.....
Consulting Engineer.

UNITED STATES OF AMERICA,

By

Constructing Quartermaster.

Approved:

Date

[Form 2—June 19, 1917.]

[Cantonment Construction, Q. M. Corps, U. S. A., 1917.]

Standard Form of Agreement with "Supervising Engineers" for Entire Work.

CONTRACT FOR GENERAL ENGINEERING

at cantonment at

Contract made and concluded this day of, 1917,

by and between

Supervising Engineer of

party of the first part (hereinafter called Engineer), and the

UNITED STATES OF AMERICA,

by Constructing Quartermaster, acting by authority of the Secretary of War, party of the second part.

Whereas the Congress having declared by Joint Resolution approved April 6, 1917, that war exists between the United States of America and Germany, a national emergency exists and the United States urgently requires the immediate performance of the work hereinafter described, and it is necessary that said work shall be completed within the shortest possible time; and

Whereas it is advisable under the disturbed conditions which exist in the engineering field throughout the country for the United States to depart from the usual procedure and adopt means that will insure the most expeditious results; and

Whereas the Engineer has had experience in the design and construction of similar work, and is ready to undertake the same terms and conditions herein provided;

Now, therefore, this contract witnesseth, That in consideration of the premises and the payments to be made as hereinafter provided, the Supervising Engineer hereby covenants and agrees to and with the Constructing Quartermaster as follows:

1. *Character and extent of service.*—The professional services desired of the Supervising Engineer and his assistants comprise the necessary preliminary studies required to adapt the typical plans to the selected cantonment site, the preparation of layout on the ground and of working drawings; the design and preparation of detailed plans for the water supply and sewerage systems; the furnishing of the governing lines, bench marks and grades; the determining of the location of buildings and engineering structures; the preparation of specifications, so far as required, and of bills of materials; the inspection and checking of materials; the general supervision of construction work, and the preparation of record drawings, and perform such other engineering work as the Constructing Quartermaster may direct.

2. *Period of service.*—The period of the service of the Supervising Engineer will extend to the time of the completion of the contract for the construction of the cantonment, and thereafter until the services set forth in paragraph 1 are completed.

3. *Fee.*—(See also Nos. 4, 5, 6, and 7.) The fee payable by the United States of America, through its Constructing Quartermaster, to the Supervising Engineer to compensate him for the performance of the services set forth under this contract and to cover the overhead costs of his own office, is to be three-fourths of one per cent ($\frac{3}{4}$ of 1%) of the total final cost of the construction contract, subject to such conditions and modifications as herein set forth.

4. *Reimbursements.*—The United States of America, through the Constructing Quartermaster, is to reimburse the Supervising Engineer—in addition to the amount of the salaries paid to assistants as set forth below—for the actual expenses of travel required in connection with the work.

5. *Assistants.*—The Supervising Engineer shall employ such principal assistant engineers, assistant engineers, designers, instrument men, draftsmen, and assistant draftsmen, secretarial assistants, inspectors, and other assistants as may be required and subject to the approval of the Constructing Quartermaster, who shall reimburse the Supervising Engineer monthly the amount of his actual payments for such services upon submission of duly executed vouchers therefor.

6. *Special assistance to be furnished.*—The Constructing Quartermaster is to provide the services of a town planner and of such consulting engineers as may be necessary in the judgment of the Constructing Quartermaster to assist the Supervising Engineer.

7. *Payments.*—Whether the construction work be completed or whether its execution be suspended or abandoned in part or whole, payments to the Supervising Engineer are to be made as follows:

On account of his fee:

- (a) Upon the completion of the preliminary studies and of the layout plans and general working drawings, a sum equal to 30% of the fee computed upon a reasonable estimated cost of the constructing contract.
- (b) Thereafter monthly payments during the execution of the construction contract such that the total payment on account of fee shall approximate three-fourths of one per cent ($\frac{3}{4}$ of 1%) of the total cost to date of the contract work (labor and materials), until the aggregate of all payments made on account shall equal the amount of the fee computed upon the final amount of the construction contract.

On account of reimbursements and assistants:

Monthly payment of the salaries paid by the Supervising Engineer to his engineering assistants and the actual expenses of travel to the Supervising Engineer, required in connection with the work.

8. *Documents, drawings, and specifications.*—Documents, drawings, and specifications, whether the work for which they are made be executed or not, shall become, upon completion of the payments due to the Supervising Engineer under this contract, the property of the United States of America and are to be delivered to the Constructing Quartermaster.

9. *Supervision of the work.*—The Supervising Engineer shall be responsible to the Constructing Quartermaster for the general engineering supervision of the cantonment work and he shall use due care and diligence to guard the Constructing Quartermaster against defects and deficiencies in the work of the contractors, but he does not guarantee the faithful performance by the latter of their contracts.

10. *The Constructing Quartermaster's decisions.*—The extent and character of the work to be done shall be subject to the general oversight, direction, and approval of the Constructing Quartermaster to whom the Supervising Engineer in direct charge of the work shall report. In the event that there should be difference of opinion with regard to the extent and character of the work to be done, the opinion of the Constructing Quartermaster shall govern but the Supervising Engineer shall have the right of appeal to the Chief of the Cantonment Construction Department at Washington.

11. *Right to terminate contract.*—Should the Supervising Engineer at any time refuse, neglect, or fail to prosecute the work with promptness and diligence or default in the performance of any of the agreements herein contained, the Constructing Quartermaster may, at his option, after five days' written notice to the Supervising Engineer, terminate this contract and may enter upon the premises and take possession for the purpose of completing said work; of all materials, equipment, and appliances, and may complete or employ any other person or persons to complete said work. In case of such termination of contract the Constructing Quartermaster shall pay to the Supervising Engineer such amounts of money on account of the unpaid balance of the cost of the work and of the fee as will result in fully reimbursing the Supervising Engineer for his costs to date plus his fee computed on proportion of the work completed up to the time of such termination to the total work to be done; and the Constructing Quartermaster shall also pay to the Supervising Engineer either by purchase or rental at the election of the Constructing Quartermaster, for any equipment retained. The Supervising Engineer hereby agrees that such payments when made shall constitute full settlement of all claims of the Supervising Engineer against the Constructing Quartermaster and the United States of America or either of them for money claimed to be due to the Supervising Engineer for any reason whatsoever. When the Constructing Quartermaster shall have performed the duties incumbent upon him under the provisions of this article the Constructing Quartermaster shall thereafter be entirely released and discharged of and from any and all demands, actions, or claims of any kind upon the part of the Supervising Engineer hereunder or account hereof.

12. *Abandonment of work by the Constructing Quartermaster.*—If conditions should arise which in the option of the Constructing Quartermaster make it advisable or necessary to cease work under this contract, the Constructing Quartermaster may abandon the work and terminate this contract. The Constructing Quartermaster shall pay to the Supervising Engineer such an amount of money, on account of the unpaid balance of the cost of the work to the Supervising Engineer and of his fee, as will result in the Supervising Engineer receiving full reimbursement for the cost of the work to him up to the time of such abandonment, plus a fee computed in the same manner as that specified in the previous article; including therein the release

of the Constructing Quartermaster and of the United States of America from further obligation to the Supervising Engineer.

13. *No participation in profits by Government officials.*—No Member or Delegate to Congress, or Resident Commissioners, nor any other person belonging to or employed in the military service of the United States of America is or shall be admitted to any share or part of this contract, or to any benefit that may arise therefrom, but this article shall not apply to this contract so far as it may be approved within the operation or exception of section 116 of the act of Congress approved March 4, 1909 (35 Stats. 1109).

14. *Settlement of disputes.*—This contract shall be interpreted as a whole and the intent of the whole instrument rather than the interpretation of any special clause shall govern, if any doubts or disputes shall arise as to the meaning or interpretation of anything in this contract, or if the Supervising Engineer shall consider himself prejudiced by any decision of the Constructing Quartermaster made under the provisions of article 10 hereof, the matter shall be referred for determination to the officer in the Washington headquarters in charge of cantonment construction. If, however, the Supervising Engineer shall feel aggrieved by the decision of said officer he shall have the right to submit the same to the Secretary of War, whose decision shall be final and binding upon both parties hereto.

15. This contract shall bind and inure to the Supervising Engineer and his successors. It is understood and agreed that wherever the words "Constructing Quartermaster" are used herein the same shall be construed to include his successor in office, and any other person to whom the duties of the Constructing Quartermaster may be assigned by the Secretary of War and any duly appointed representative of the Constructing Quartermaster.

Witness the hands of the parties hereto the date and year first above written, all in triplicate.

.....
Supervising Engineer.

UNITED STATES OF AMERICA,

By

Constructing Quartermaster.

Approved:

Date

.....
[Form 3.—June 19, 1917.]

[Cantonment Construction, Q. M. Corps, U. S. A., 1917.]

*Standard Form of Agreement with "Supervising Engineers" for
Limited Service.*

CONTRACT FOR SUPERVISORY ENGINEERING SERVICE: LIMITED

to the specific branch of
at cantonment at

Contract made and concluded this day of, 1917,
by and between

Supervising Engineer of
party of the first part (hereinafter called Engineer), and the

UNITED STATES OF AMERICA,

by Constructing Quartermaster, acting by authority of the Secretary of War, party of the second part.

Whereas the Congress having declared by Joint Resolution approved April 6, 1917, that war exists between the United States of America and Germany, a national emergency exists and the United States urgently requires the immediate performance of the work hereinafter described, and it is necessary that said work shall be completed within the shortest possible time; and

Whereas it is advisable under the disturbed conditions which exists in the Engineering field throughout the country for the United States to depart from the usual procedure and adopt means that will insure the most expeditious results; and

Whereas the Engineer has had experience in the design and construction of similar work and is ready to undertake the same upon the terms and conditions herein provided;

Now, therefore, this contract witnesseth, That in consideration of the premises and the payments to be made as hereinafter provided, the Supervising Engineer hereby covenants and agrees to and with the Constructing Quartermaster as follows:

1. *Character and extent of service.*—The professional services desired of the Supervising Engineer (and his assistants) comprise

.....
2. *Period of service.*—The period of the service of the Supervising Engineer will extend to the time of the completion of the construction by the contractor of the particular branch of the work of the cantonment with which the Supervising Engineer is concerned, and thereafter until the services set forth in paragraph 1 are completed.

3. *Fee.*—(See also Nos. 4, 5, 6 and 7.) The fee payable by the United States Government, through its Constructing Quartermaster, to the Supervising Engineer to compensate him for the performance of the services set forth under this contract and to cover the overhead costs of his own office, will be the lump sum of _____ dollars. (\$———), subject to such conditions and modifications as herein set forth, in addition to allowances for extra services, reimbursements for assistants, traveling and other proper expenses.

4. *Extra services.*—After plans have been approved by the Constructing Quartermaster, should the latter make a decision which for its proper execution involves very substantial extra amount of service and expense for changes or additions thereto, or should such extra service be involved by any cause arising out of the work, other than the Engineer's neglect, or as a result of extraordinary conditions or of damage by fire, the Supervising Engineer shall be paid for such extra services or expense as may be equitably determined by the Constructing Quartermaster.

5. *Reimbursements.*—The United States of America, through the Constructing Quartermaster, is to reimburse the Supervising Engineer—in addition to the amount of the salaries paid to assistants as set forth below—for the actual expenses of travel required in connection with the work.

6. *Assistants.*—The Supervising Engineer shall employ such principal assistant engineers, assistant engineers, designers, instrument men, draftsmen and assistant draftsmen, secretarial assistants, inspectors, and other assistants as may be required and subject to the approval of the Constructing Quartermaster, who shall reimburse the Supervising Engineer monthly the amount of his actual payments for such services upon submission of duly executed vouchers therefor.

7. *Special assistance to be furnished.*—The Constructing Quartermaster is to provide the services of a town planner and of such consulting engineers as may be necessary in the judgment of the Constructing Quartermaster to assist the Supervising Engineer.

8. *Payments.*—Whether the construction work be completed or whether its execution be suspended or abandoned in part or whole, payments to the Supervising Engineer are to be made as follows:

On account of his fee:

- (a) Upon the completion of the preliminary studies and of the layout plans and general working drawings, a sum equal to 30% of the fee.
- (b) Thereafter monthly payments, during the execution of the construction contract, such that the ratio of the total payment on account of fee, to the total fee, shall approximate the ratio of the completed, to the total work to be done by him; until the aggregate of all payments made on account shall equal the amount of the fee.

On account of reimbursements and assistants.

Monthly payment of the salaries paid by the Supervising Engineer to his engineering assistants and the actual expenses of travel to the Supervising Engineer, required in connection with the work.

The general range of salaries for the engineering assistants is as follows:

Principal assistant engineers, up to \$350 per month.

Assistant engineers and designers, up to \$250 per month.

Instrument men and draftsmen, up to \$175 per month.

• Junior draftmen and secretarial assistants, up to \$125 per month.

Assistants, up to \$90 per month.

9. *Documents, drawings, and specifications.*—Documents, drawings, and specifications, whether the work for which they are made be executed or not, shall become, upon completion of the payments due to the Supervising Engineer under this contract, the property of the United States of America, and are to be delivered to the Constructing Quartermaster.

10. *Supervision of the work.*—The Supervising Engineer shall be responsible to the Constructing Quartermaster for the engineering supervision of the branch of the cantonment work entrusted to him, and he shall use due care and diligence to guard the Constructing Quartermaster against defects and deficiencies in the work of the contractors, but he does not guarantee the faithful performance by the latter of their contracts.

11. *The Constructing Quartermaster's decisions.*—The extent and character of the work to be done shall be subject to the general oversight, direction, and approval of the Constructing Quartermaster, to whom the Supervising Engineer in direct charge of the work shall report. In the event that there should be difference of opinion with regard to the extent and character of the work to be done the opinion of the Constructing Quartermaster shall govern, but the Supervising Engineer shall have the right of appeal to the Chief of the Cantonment Construction Department at Washington.

12. *Right to terminate contract.*—Should the Supervising Engineer at any time refuse, neglect, or fail to prosecute the work with promptness and diligence, or default in the performance of any of the agreements herein contained, the Constructing Quartermaster may, at his option, after five days' written notice to the Supervising Engineer, terminate this contract and may enter upon the premises and take possession for the purpose of completing said work, of all materials, equipment, and appliances, and may complete or employ any other person or persons to complete said work. In case of such termination of contract, the Constructing Quartermaster shall pay to the Supervising Engineer such amounts of money on account of the unpaid balance of the cost of the work and of the fee as will result in fully reimbursing the Supervising Engineer for his costs to date plus his fee computed on proportion of his work completed up to the time of such termination to the work to be done; and the Constructing Quartermaster shall also pay to the Supervising Engineer either by pur-

chase or by rental at the election of the Constructing Quartermaster for any equipment retained. The Supervising Engineer hereby agrees that such payments when made shall constitute full settlement of all claims of the Supervising Engineer against the Constructing Quartermaster and the United States or either of them for money claimed to be due to the Supervising Engineer for any reason whatsoever. When the Constructing Quartermaster shall have performed the duties incumbent upon him under the provisions of this article the Constructing Quartermaster shall thereafter be entirely released and discharged of and from any and all demands, actions, or claims of any kind upon the part of the Supervising Engineer hereunder or account hereof.

13. *Abandonment of work by the Constructing Quartermaster.*—If conditions should arise which, in the opinion of the Constructing Quartermaster, make it advisable or necessary to cease work under this contract, the Constructing Quartermaster may abandon the work and terminate this contract. The Constructing Quartermaster shall pay to the Supervising Engineer such an amount of money on account of the unpaid balance of the cost of the work to the Supervising Engineer and of his fee as will result in the Supervising Engineer receiving full reimbursement for the cost of the work to him up to the time of such abandonment, plus a fee computed in the same manner as that specified in the previous article, including therein the release of the Constructing Quartermaster and of the United States from further obligation to the Supervising Engineer.

14. *No participation in profits by Government officials.*—No Member or Delegate to Congress, or Resident Commissioners, nor any other person belonging to or employed in the military service of the United States, is or shall be admitted to any share or part of this contract, or to any benefit that may arise therefrom; but this article shall not apply to this contract so far as it may be approved within the operation or exception of section 116 of the act of Congress approved March 4, 1909 (35 stats. 1109).

15. *Settlement of disputes.*—This contract shall be interpreted as a whole, and the intent of the whole instrument rather than the interpretation of any special clause shall govern. If any doubts or disputes shall arise as to the meaning or interpretation of anything in this contract, or if the Supervising Engineer shall consider himself prejudiced by any decision of the Constructing Quartermaster made under the provisions of Article II hereof, the matter shall be referred for determination to the officer in the Washington headquarters in charge of cantonment construction. If, however, the Supervising Engineer shall feel aggrieved by the decision of said officer, he shall have the right to submit the same to the Secretary of War, whose decision shall be final and binding upon both parties hereto.

16. This contract shall bind and inure to the Supervising Engineer and his successors. It is understood and agreed that wherever the words "Constructing Quartermaster" are used herein the same shall be construed to include his successor in office and any other person to whom the duties of the Constructing Quartermaster may be assigned by the Secretary of War and any duly appointed representative of the Constructing Quartermaster.

Witness the hands of the parties hereto, the date and year first above written, all in triplicate.

.....,
Supervising Engineer.
 UNITED STATES OF AMERICA,
 By
Constructing Quartermaster.

EXHIBIT No. 5.

Basic papers relative to adjustment and control of wages, hours, and conditions of labor:

WAR DEPARTMENT,
Washington, June 19, 1917.

For the adjustment and control of wages, hours, and conditions of labor in the construction of cantonments, there shall be created an adjustment commission of three persons, appointed by the Secretary of War; one to represent the Army, one the public, and one labor; the last to be nominated by Samuel Gompers, member of the Advisory Commission of the Council of National Defense and president of the American Federation of Labor.

As basic standards with reference to each cantonment, such commission shall use the union scales of wages, hours, and conditions in force on June 1, 1917, in the locality where such cantonment is situated. Consideration shall be given to special circumstances, if any, arising after said date which may require particular advances in wages or changes in other standards. Adjustments of wages, hours, or conditions made by such board are to be treated as binding by all parties.

NEWTON D. BAKER.
SAM'L GOMPERS.

AUGUST 10, 1917.

I agree to this policy for the Navy.

JOSEPHUS DANIELS.

JUNE 20, 1917.

MR. FRANK MORRISON,
Secretary American Federation of Labor, Washington, D. C.

Re: Cantonment construction labor conditions.

MY DEAR MR. MORRISON: Confirming our talk over the telephone this afternoon, it must be clearly understood, as a basis for any labor-adjustment machinery, that the Government can not commit itself in any way to the closed shop, and that the conditions in force on June 1, 1917, which are to serve as part of the basic standards, do not include any provisions which have reference to the employment of nonunion labor. In our telephone talk just now I understand that you accede to this view. The word "conditions" is, of course, clearly understood to refer only to the union arrangements in the event of overtime, holiday work, and matters of that kind. This was clearly understood between Mr. Gompers and myself this morning when we agreed that it would not be legally possible at this time to insert an understanding—even so much as a provision—that preference be given to members of organized labor.

Very truly yours,

LOUIS B. WEHLE.

Copy to Mr. Gompers.

[Western Union telegram.]

NEW YORK, N. Y., June 22.

LOUIS B. WEHLE,
901 Munsey Building, Washington, D. C.:

Your understanding of the memorandum signed by Secretary Baker and me is right. It had reference to union hours and wages. The question of union shop was not included.

SAMUEL GOMPERS.

JUNE 23, 1917.

SAMUEL GOMPERS, Esq.,

President American Federation of Labor, Washington, D. C.:

Re: Cantonment construction labor conditions.

MY DEAR MR. GOMPERS: I acknowledge receipt from you yesterday evening of the following telegram:

"NEW YORK, N. Y., June 22.

"LOUIS WEHLE,

"901 Munsey Building, Washington, D. C.:

"Your understanding of the memorandum signed by Secretary Baker and me is right. It had reference to union hours and wages. The question of union shop was not included.

"SAMUEL GOMPERS."

This completes the record sufficiently for me to be able to deliver the memorandum over to Mr. Secretary Baker. So long as there was a possibility that anyone could misunderstand the intention of the memorandum in connection with the question of the union shop I deemed it best to keep the memorandum undelivered. Of course, the Government could not possibly, under the present state of the law, commit itself in the employment of labor to employing only union labor, or even to give preference to union labor.

The consummation of this informal memorandum will, I hope, result beneficially to all parties and be a help to the Government in this emergency.

Very truly yours,

LOUIS B. WEHLE.

WAR DEPARTMENT.
WASHINGTON.

Procedure under the memorandum of June 19, 1917, signed by Newton D. Baker and Samuel Gompers.

1. The Cantonment Adjustment Commission will sit at Washington, D. C., unless specially ordered by the Secretary of War to go to the site of a construction.

2. It will obtain full information of union scales of wages, hours and conditions in force on June 1, 1917, in the several localities where cantonments are to be constructed. For such labor as is being or will be employed on such work, for this information the commission will rely upon data furnished so far as may be practicable by the Department of Labor.

3. The cantonments will be conveniently distributed and the Secretary of War will for the period of the construction and with the unanimous approval of the commission, appoint for each district a responsible impartial examiner who shall act under the orders of the commission.

4. If a dispute arises which can not be adjusted satisfactorily by the contracting officer at the site and the employees involved, the contracting officer shall issue a provisional order which may be affirmed, reversed, or modified by the adjustment commission.

5. In cases where the provisional order of the contracting officer is not accepted, the actual work of construction shall not be interrupted, but the contracting officer shall notify the member of the commission representing the Army of the matter in dispute, the proposals made by each party for adjustment, and of the provisional order which

he has issued. At the same time the member of the commission designated by Mr. Gompers shall obtain from a reliable source a report on the matter in dispute.

6. If the commission is notified that a dispute is not adjusted satisfactorily at the site, or if it learns from other sources that a dispute is in such condition, it will as speedily as possible send an examiner to the site.

7. The examiner shall have authority, acting under the orders of the commission, to mediate between the parties. If he fails in this he shall report promptly and fully to the commission with a recommendation. The examiner shall, if ordered by the commission or by any one of its members, remain at the site to supply any further information that may be asked.

8. The rulings of the commission are binding upon all parties concerned.

9. Notice of a ruling shall be sent to the contracting officer and to the spokesmen of the parties involved in the dispute.

10. The examiner will supervise the application of the commission's rulings with reference to hours, wages, and conditions and with reference to any accounting which may be proper under such ruling. Any change in wages, hours or their application, when finally agreed to, or when finally fixed by the commission, shall for accounting purposes be effective so far as practicable as of the date which may be fixed by the agreement, or by the ruling of the commission.

11. The commission shall have power to make additional regulations in order to achieve the purpose of the memorandum, and shall decide all questions arising under it.

[On July 27, 1917, the following supplementary agreement was signed:]

"The arrangement for the adjustment of wages, hours and conditions of labor, entered into between the signers of this memorandum, on June 19, 1917, with reference to cantonment construction, may, on order of the Secretary of War, be extended to embrace any other construction work which is now being, or may be from time to time during the war, carried on by the War Department.

"NEWTON D. BAKER.

"SAMUEL GOMPERS."

[On August 8, 1917, acting under this supplementary agreement, the construction of aviation fields was placed within the jurisdiction of the commission.]

[On September 4, 1917, the construction of warehouses and storage facilities was placed within the jurisdiction of the commission.]

WAR DEPARTMENT,

Washington, December 28, 1917.

It is hereby directed that all construction work undertaken by the War Department during the present emergency shall be carried out under the arrangement for the adjustment of wages, hours and conditions of labor which was entered into between Mr. Samuel Gompers and myself on June 19, 1917, and which, under a supplementary memorandum signed by the same parties on July 27, 1917, may be extended by me to embrace other construction work under the War Department.

BAKER, *Secretary of War.*

Copy to Samuel Gompers, Esq., President American Federation of Labor, Washington, D. C.

EXECUTIVE ORDER.

Under authority contained in the naval appropriation act approved March 4, 1917 (Public, No. 391, 64th Cong.), whereby it is provided,

"That in case of national emergency the President is authorized to suspend provisions of law prohibiting more than eight hours labor in any one day of persons engaged upon work covered by contracts with the United States: *Provided further*, That the wages of persons employed upon such contracts shall be computed on a basic day rate of eight hours work with overtime rates to be paid for at not less than time and one-half for all hours work in excess of eight hours."

it is hereby ordered that the provisions of the act approved June 19, 1912, limiting the hours of daily service of mechanics and laborers on work under contracts to which the United States is a party are suspended with respect to all contracts for ordnance and ordnance stores, and other military supplies and material, and contracts for fortification work, during the pending emergency and until further orders. This order shall take effect from and after this date.

THE WHITE HOUSE, 24th March, 1917.

WAR DEPARTMENT.

In order to settle conflicts and to avoid confusion and delay it has become necessary to secure better administration and enforcement by the War Department of the provisions of law requiring time and a half for overtime work under certain class of Government contracts.

To accomplish this end I have detailed Mr. Felix Frankfurter. It will be his duty—

1. To keep informed as to every phase of the administration of the laws dealing with the eight-hour limitation, and time and a half for overtime work.

2. To advise as to these laws any officer or agency of the department engaged in making contracts or purchases.

3. To make rulings, in cooperation with the Judge Advocate General, on any matter which is part of the administration or enforcement of these. Specifically:

(1) What contracts are affected by the laws above mentioned.

(2) The interpretation to be placed upon any of the provisions of these laws.

(3) The methods of securing the enforcement of these laws.

The existing contract-making agencies will retain the powers they now have subject to the control above outlined. It is expected that the necessary betterment in administration and enforcement will largely result from the cooperation of the contracting, purchasing and inspecting officials of the department with Mr. Frankfurter in the exercise of the advisory powers with which he is charged.

A copy of the foregoing should be read by every official and agency making contracts or purchases for the War Department, and by the chief or other head of every inspection division or branch making inspections for the department under any of the said contracts or purchases.

NEWTON D. BAKER.

The above instructions of the Secretary of War (A. G. 230.4421) are furnished for information and guidance. Any questions arising on the subject referred to in connection with contracts of the Quartermaster Corps should be submitted to Mr. Frankfurter, through this office.

By authority of the Quartermaster General:

CHAS. P. DALY,

Captain, M. S., Quartermaster Corps.

EXHIBIT No. 6.

[Board of Review of War Department Construction Work, Room H-224, Building C, Seventh and B Streets SW., Washington, D. C.]

Memorandum of Desired Information.

NOVEMBER 10, 1918.

If sufficient space is not provided for the answer to any question, please write same on a separate sheet and attach hereto. Return this form to Board of Review when completed.

10. Project.

(a) Name: Originally Norfolk Quartermaster Terminal, now Army supply base, Norfolk, Va.

(b) Number: 27—Appendix A.

20. Location.

On the east side of the Elizabeth River or Hampton Roads at Bush Bluff, extending from Bush Bluff to Tanners Point, about 6 miles north of the downtown district of the city of Norfolk. Entire project is outside of the city limits and in the Tanners Creek magisterial district, Norfolk County, Va.

30. General description.

(a) Purpose and capacity of project as originally authorized by the Secretary of War.

Quartermaster terminal for storage and overseas shipment, consisting primarily of one creosoted timber pier approximately 400 by 1,500 feet, of which 97,300 square feet was covered and 320,500 square feet was open dock, with 30-foot channels leading to same; eight warehouses having a total area of 2,339,200 square feet, of which two were to be heated; railroad receiving and classification yards containing approximately 23 miles of track; open storage yard; together with the necessary water, sewer, and road systems, a small portion of the latter only being paved; entire contemplated area consisting of 553 acres.

(b) Capacity as enlarged by all subsequent authorizations. Two reinforced concrete piers having one-story pier sheds with steel frame, approximately one-half of pier shed on Pier 2 being two-storied; 2,030 feet (linear) of quay wall, providing berths at end of warehouses with 35-foot channels; eight warehouses of same type as original authorization, two of which are heated; total warehouse area 2,016,000 square feet, with 89,600 feet of second-story office space; approximately 45 miles of track in railroad yards, comprising in the main a receiving yard, an outgoing yard and a classification yard; open storage yard practically as originally authorized; 17 miles of sewer; 18 miles of water main; 3,000,000 gallon water storage; housing for two battalions of guards and one regiment of stevedores; 120-bed hospital; 11.97 miles of road, consisting of 7.75 miles concrete road, 3.84 miles permanent macadam road, and 0.38 mile temporary macadam road; one 7½-ton incinerator plant; a regimental cold-storage plant and two regimental storehouses; the entire area now occupied being 912 acres, of which 524 acres was dry land originally, 218 acres of reclaimed land, and 171 acres water rights. Unification of the two water systems of Norfolk to guarantee adequate supply.

(c) Bureau or authority selecting site.

Committee from Washington appointed for purpose; name and authorization not known.

30. General description—Continued. ✓

(d) Reasons for selecting particular site.

Strategic situation with respect to deep-water channel and railway facilities, also unoccupied area of suitable property.

40. Conception and engineering.

(a) Name of bureau or division prescribing general requirements, and officer in charge.

Department of Storage and Traffic, Col. F. B. Wells in charge.

(b) Were general requirements stated in letter form only?

Yes.

(c) Date.

Date to be obtained from Chief of Construction Division, Washington, D. C.

(d) If accompanied by drawings, to what extent?

None.

(e) Date delivered.

To be furnished by Chief of Construction Division, Washington, D. C.

(f) To what extent, if any, did originating bureau have inspectors in field?

There was one inspector in the field for about three months, who was designated as local engineer. This man took no active part in the planning or the supervising of the construction.

(g) To what extent were working plans and specifications prepared in Washington?

Outline general plans were prepared in Washington, also general plans of the type of construction covering piers, warehouses, hospital and barrack buildings.

(h) In the field?

General working drawings of all buildings and structures, also detailed plans of same, including piers, railroad yards, water supply, sewerage system, lighting, were prepared by supervising engineer in the field.

(j) Was the material mobilized from general or from working plans in Washington or from working plans made in the field?

Materials originally mobilized were surveyed from general plans as prepared in Washington. Subsequent mobilization was made up from bills of material detailed in the field.

50. Authorization of funds.

(a) Amount of original authorization.

\$16,200,000.

(b) Total subsequent authorizations.

\$12,345,600. Of this amount \$2,500,000 was authorize to restore from appropriation I. & P. S. & S. F. to B. & Q. S. S. & T., and R. W. W. & D. There was also an added appropriation of \$275,000 to cover the Norfolk water supply unification.

(c) Disbursements to date.

Army supply base \$19,049,906.65 on November 19, 1918. Norfolk water supply \$86,106.65 on November 9, 1918.

60. History.

(a) Date of clearance of project by War Industries Board. To be furnished by Chief of Construction Division, Washington, D. C.

(b) Date of original authorization by Secretary of War.

December 21, 1917.

(c) Date of contract or other authority to proceed with work in field.

General contract signed January 21, 1918.

60. History—Continued.

(d) Date of actual commencement of field construction by contractor.

January 21, 1918. Previous to this date the supervising engineer under instructions from the Chief of Construction Division had started active construction on January 8, utilizing the services of several small contractors in this vicinity, he himself providing funds for carrying on this work, which consisted primarily of the construction of some 2 miles of railway track, 5 concrete warehouses, 1 mess hall, 3 barrack buildings for housing labor, 2 barrack buildings for offices of the general contractor and the constructing quartermaster; all of which work and forces were taken over by the general contractor immediately upon the execution of his contract.

70. Contracts for construction.

(a) General contractors.

1. Name of general contractor.

Porter Bros., a copartnership consisting of John D. Porter, Spokane, Wash.; Andrew Porter, of Portland, Oreg.; and R. B. Porter, Spokane, Wash., having their general office at Spokane.

2. Type and edition of contract.

Q. M. G. O., second edition, 10-17, Contract for Emergency Work.

3. Fee, general contractor.

\$250,000.

4. Contractor's fees from other Government contracts during the war.

National Army cantonment, Camp Custer, Mich., \$250,000.

Norfolk water supply, Norfolk, Va., \$10,000.

(b) Subcontracts.

1. Fees, cost-plus subcontractors (enumerate, giving name, work and fee).

The Raymond Concrete Pile Co., of New York City. The casting of concrete piles and construction of such portion of concrete piers and quay wall, also other miscellaneous dock work as designated by the constructing quartermaster. Fees paid \$82,990.55, unpaid \$82,990.55, earned \$165,981.10.

James E. McCoy, jr., Norfolk, Va. Plumbing. Fees paid \$9,710.11, unpaid \$11,097.27, earned \$20,807.38.

R. G. Lassiter Co., Raleigh, N. C. Roads and concrete paving, including a portion of warehouse floors. Fees paid \$19,429.16, unpaid \$19,429.16, earned \$38,858.32.

H. P. Converse & Co., Boston, Mass. Completion of the timber portion of Pier 1 as begun by that firm under their contract with the city of Norfolk. Fees paid \$24,682.94, unpaid \$24,682.94, earned \$49,365.88.

George H. Howell, Detroit, Mich. Electrical work to the easterly side of Maryland Avenue, consisting principally of work in the barracks and quarters of troops and the base hospital. Fees paid \$4,241.15, unpaid \$5,758.85, earned \$10,000.

S. B. Batte, Norfolk, Va. Electrical work to the west of Maryland Avenue, consisting primarily of work on the piers, the various warehouses, and open storage yard. Fees paid \$5,638.82, unpaid \$2,416.64, earned \$8,055.46.

The Cement Gun Construction Co., Chicago, Ill. Guncrete walls for six warehouses, also roof of a portion of the pier sheds and fire curtains in same. Fees paid \$2,493.40, unpaid \$4,630.66, earned \$7,124.06.

70. Contracts for construction—Continued.

(b) Subcontracts—Continued.

1. Fees, cost-plus subcontractors—Continued.

Atlantic, Gulf & Pacific Co., New York, N. Y. Hydraulic dredging and filling. Fees paid \$9,662.49, unpaid \$24.25, earned \$9,686.74.

2. Fees from other Government contracts during the war.

Not known, to be furnished by Chief of Construction Division, Washington, D. C.

(c) Lump-sum contracts.

Sparks Crematory & Construction Co., Memphis, Tenn., furnishing material and installation of incinerator, \$5,400.

Powers Regulator Co., New York, material and installation of temperature control, warehouses 4 and 5, \$5,760.

Union Iron Works, Springfield, Mo., refrigerating plant installed complete, \$5,315.

Chain Belt Co., Milwaukee, Wis., coal handling machinery erected, \$4,370.

Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa., one 200,000-gallon water-storage tank erected on 75-foot steel tower, \$15,400.

Rust Engineering Co., Washington, D. C., 135-foot brick and tile stack erected for heating plant, \$3,650.

S. B. Sexton Stove & Manufacturing Co., Baltimore, Md., hospital kitchen equipment, \$1,344.80.

Hubbard Oven Co., Chicago, Ill., furnishing and installing bake oven, \$1,066.97.

(d) Unit-price contracts.

Oden'hal-Monks Corporation, Norfolk, Va., furnishing material and installation of built-up roofing for pier sheds, \$6 per square.

Asbestos Roofing Co., Baltimore, Md., furnishing material and installing built-up roofing for warehouses, \$5.75 per square.

American Bridge & Iron Co., Pittsburgh, Pa., erection of steel for pier shed 1, \$19.50 per ton; erection of steel for pier shed 2, \$19 per ton; furnishing of steel and erection of same for the second-story portion of pier shed 2, \$130 per ton.

General Fire Extinguisher Co., Charlotte, N. C., the furnishing of material and installation of automatic sprinkler system for warehouses and pier sheds, prices to be determined.

Kinnear Manufacturing Co., Columbus, Ohio, furnishing of material and erection complete of pier-shed doors from warehouse stock, at \$832.65 each; from mill stock at \$776.65 each.

Sanitary Flooring Co., Washington, D. C., the furnishing of material and installing of composition flooring in portions of the administration building, at \$0.32 per square foot.

In addition to the above the supervising engineer employed the following emergency contractors before the letting of the general contract: William A. Bullard Co., Norfolk, Va., temporary electrical work, fee on 10 per cent basis, total \$348.86.

Silsby & Lohr, housing, 10 per cent basis, total fee \$2,810.75.

J. E. McCoy, jr., Norfolk, Va., temporary plumbing and heating, 10 per cent basis, total fee \$536.89.

Herman Drinkwater, Norfolk, Va., clearing a site, grading, and some building and track construction, also unloading construction materials, 10 per cent basis, total fee \$11,220.45.

80. Government resident organization.

(a) Constructing quartermaster.

Millard A. Butler, Colonel, Q. M. C., U. S. A.; civil engineer by profession; 18 years general railroad and construction experience, principally with the Hill lines, St. Paul, Minn.; chief engineer Twin City Belt Railway immediately before entering service; from June, 1917, to January, 1918, major, Q. M. R. C., constructing quartermaster thirteenth National Army cantonment, Camp Dodge, Des Moines, Iowa.

Personal staff consists of the following:

J. H. Nankivell, Major, M. C., sanitary inspector.

D. L. Van Auken, Captain, Quartermaster Corps, executive officer, also intelligence officer.

A. H. Kennedy, Captain, Quartermaster Corps, procurement officer.

E. F. Spink, Captain, Quartermaster Corps, disbursing officer.

E. A. Rumfelt, Captain, Quartermaster Corps, property officer.

J. G. Browne, Captain, Quartermaster Corps, administrative officer, also officer in charge of motor transportation.

E. G. Dyer, Captain, Sanitary Corps, sanitary engineer.

C. M. Krenson, Captain, Quartermaster Corps, priority officer assigned to duty as representative of constructing quartermaster in the board of control, war construction activities, Hampton Roads district, with offices in Norfolk.

(b) Field engineering and construction.

1. Supervising engineer.

A. O. Leach, of St. Paul, Minn.

2. If by contract, name of firm, class of work, responsibility and fee.

Contract. A. O. Leach acted as chief engineer of entire construction, including the inspection of material as to quality.

3. Type or form of contract.

Original contract, special agreement, expired September 1, 1918; fee \$3,600. Second contract, special agreement, drawn up September 1, 1918, expiring December 31, 1918; fee \$3,000.

4.

5.

No work handled by officers.

6. Organization chart showing personnel.

Attached.

7. Remarks.

Supervising engineer brought nucleus of his organization from the construction of the thirteenth National Army cantonment, Camp Dodge, Iowa, where he acted in a similar capacity, augmenting same by the addition of division and assistant engineers who from previous experience were qualified for handling the construction of piers and the dredging operations.

(c) Method of checking material as to quality.

By supervising engineer, through corps of inspectors on the work, who also check the installation.

(d) Method of checking equipment.

Each piece is tagged with a serial number on its arrival, record of same kept by the field auditor, valuation and rental rates approved by the constructing quartermaster. Release is ordered through the supervising engineer and approved by the constructing quartermaster.

80. Government resident organization—Continued.

(e) Accounting.

1. Name of field auditor.

J. A. Fitzmaurice.

2. Organization chart showing personnel.

Attached.

3. Remarks.

Mr. Fitzmaurice acted as chief clerk to the field auditor on the construction of the thirteenth National Army cantonment, Camp Dodge, Iowa. Previous to this time he had several years' auditing experience. The nucleus of this organization was brought intact from the Camp Dodge work.

(f) Any variation from field auditor's manual, etc.

1. Timekeeping is handled by Government timekeepers to expedite reimbursement to the contractor. Authorized by special letter from Construction Division of the Army. (Further details of timekeeping included in Camp Dodge questionnaire, which please see.)

2. Time kept by Government or contractor?

By Government employees on field auditor's staff.

3. Method of timekeeping employed at start and at present.

No change.

4. Method of making up pay rolls and paying off.

Government time office completes pay rolls and certifies same to contractor, who issues checks on each Saturday for week ending previous Wednesday, all employees being paid through one central time office, each individual signing pay roll, each sheet of pay roll being witnessed by Government and contractor's employee.

5. Method of payment to contractor.

Eighty per cent of pay rolls paid to contractor on Monday following Saturday pay off, balance paid by Wednesday, when amount of unclaimed wages have been estimated.

6. Method of checking material as to quantity.

Checked by staff of material checkers carried on the pay roll of the field auditor. All materials checked immediately upon its delivery to the work.

90. Contractor's organization.

(a) Contractor's home office and branch offices.

Home office, Spokane, Wash. Branch offices, Portland, Oreg.; Wilkes-Barre, Pa.; Albany, N. Y.; Halifax, Nova Scotia.

(b) Committee on Emergency Construction's recommendation as to contractor.

To be furnished by Chief of Construction Division, Washington, D. C.

(c) Former experience on similar work.

Construction of National Army cantonment at Camp Custer, Battle Creek, Mich.; construction of British Government ocean terminals at Halifax, Nova Scotia, beginning in latter part of 1913; many years' experience as general contractors on building, municipal, and railroad work.

(d) Reasons considered in selecting contractor.

Contractor had available the required organization and a large portion of the equipment for carrying out the construction.

(e) Organization chart showing personnel.

Attached.

90. Contractor's organization—Continued.

(f) Remarks.

Contractor, as represented in person by Mr. R. B. Porter, has been almost continually on the ground since the inception of the work and in cooperation with the Governmental departments, and the spirit of endeavor to carry on the work with speed, yet economically, has been of the best.

100. Contractor's investment.

(a) Working cash capital used.

\$645,000.

(b) Value and character of plant provided by contractor.

\$1,100,000, consisting principally of locomotives, steam shovels, dump cars, locomotive cranes, pile drivers, hoisting engines, rail, and miscellaneous equipment.

(c) Time given to job by contractor's men who are not on job pay roll.

None, with the exception of Mr. R. B. Porter, as noted above.

(d) Other facilities given to job for which there is no reimbursement outside of fee.

Services of office in Wilkes-Barre, Pa., in lining up the organization and the shipping of material and equipment to the work.

110. Available facilities when contract was let.

(a) Steam railroads.

Seven trunk railroads in the city of Norfolk, all connected with the site of the work by the Norfolk & Portsmouth Belt Line Railway Co., operating over the line of the Virginian Railway. In order to place the Belt Line in position to properly handle the tonnage which is expected to pass through this base, it was necessary to provide for double-tracking the Virginian Railway between the base and the Belt Line junction in Portsmouth, this work being done to a considerable extent by contractor's forces on the Government pay roll, careful record being kept of same, entire amount being billed to the Virginian Railway Co., who in turn have reimbursed the Government through the constructing quartermaster for all expense incurred therewith.

(b) Electric railroads.

Virginia Railway & Power Co., operating a double-track electric system. This company had two gauges in Norfolk, 25 per cent being 4-foot 8½-inch gauge and 75 per cent being 5-foot 2-inch gauge. This work was on the 4-foot 8½-inch gauge, and in order to obtain service and the use of surplus equipment it was necessary to change same to 5-foot 2-inch. This work, consisting of the widening of 7½ miles of double track, was done to a considerable extent by Government forces, a careful check being kept of all time and expense incurred in connection therewith, same being billed to the Virginia Railway & Power Co., who immediately reimbursed constructing quartermaster, these funds being deposited to the credit of the Treasurer of the United States.

(c) Highways.

The work is located on Jamestown Boulevard, a paved road extending to the city of Norfolk.

110. Available facilities when contract was let—Continued.

(d) Water supply—how provided?

The Norfolk County Water Co., a private corporation, had one 12-inch main extending to the work. The city of Norfolk municipal plant had one 16-inch and one 12-inch main extending to the work. The county company had a large watershed and small storage. The city had comparatively large storage with about the same size watershed. In recent dry years these companies had not been able to furnish the city of Norfolk a sufficient amount of water. The present requirements, including the increase in the city, amounting to possibly 175 per cent, the Army base and the naval base, necessitated an increased supply, the immediate necessity of which is being cared for by a unification of the two systems by the constructing quartermaster of the Army supply base, under a direct appropriation of \$275,000 providing for same. The supply is also being further augmented by a reinforcement of the Portsmouth-Berkley-Suffolk water supply under an appropriation of \$1,800,000, as recommended by the board of control, War Construction Activities, and handled by a separate constructing quartermaster.

(e) Electricity supply—how provided?

Virginia Railway & Power Co., through a Government-owned substation. While this supply at the present is not sufficient for the ultimate needs, indications are that within a few months the power company will have installed sufficient additional equipment to take care of all requirements.

(f) Sewerage disposal—how provided?

There was no sewer system in place at the time work was started. The sanitary sewerage from the cantonments on the east of Maryland Avenue and from the base hospital are taken care of by septic tanks, the effluents being pumped into Boush Creek below the tidewater, which was put in for sanitary reasons. It is now planned to put in a permanent pumping station, pumping sanitary sewerage into the deep waters of the Elizabeth River. The portion of the ground occupied by the open storage warehouses taken care of by combined sanitary and storm sewer system now under construction.

(g) What local facilities were available for housing and feeding?

None. In addition to the barrack buildings which were constructed for the stevedore regiment and guard battalions, constructing quartermaster authorized contractor to put windows, screens, and floors in the stables, thus turning them into sleeping quarters and saving the expense of constructing additional temporary sleeping buildings. It was also found necessary to construct some additional stables for the same purpose. Early in the work the necessity of providing quarters for colored labor was apparent, and arrangements were made for constructing 138 cheap stucco houses (20 by 35 feet) and 4 lavatories on leased ground at Titus Town. Each of these houses accommodates 10 colored laborers, and this has been the means of maintaining a steady, reliable organization on the work. Under contract with the ground owner, on completion of the work the owner pays the Government an amount which has been estimated to be the reasonable salvage value which could be expected from the buildings, thus doing away with the cost of tearing down a number of temporary structures. Eight labor mess halls were also constructed, which, together with a large mess hall which was after-

110. Available facilities when contract was let—Continued.

- (g) What local facilities were available for housing and feeding—Continued.
ward opened up in one compartment of warehouse 8, gave a total capacity of about 8,000 meals at one sitting. Ten additional barrack buildings were also constructed, and by means of temporary partitions and plumbing each building was converted into four apartments, which, together with nine small bungalows which were also constructed, were used for housing families of some of the employees whose presence at the actual site of the job at all times was considered essential to the welfare and safety of the project. Some temporary stables for contractor's teams were also constructed on ground leased by the contractor for that purpose.

120. Materials and supplies.

- (a) Percentage of material, in dollars and cents, mobilized and priced in Washington.
\$4,713,765.23; 61 per cent.
- (b) What per cent was bought locally?
\$2,522,796.66; 31 per cent. (This includes crushed rock, sand, and gravel.)
- (c) Where was balance of material and supplies secured?
Eight per cent on requisition from the Quartermaster Department and from other jobs of the Construction Division.
- (d) Authority for commandeering from local stock.
There was nothing commandeered from local stock.
- (e) Conditions.
Local market afforded fair facilities for obtaining various materials, both as to quantity and price.

130. Labor.

- (a) Character.
White and negro, recruited from various States, including those as far west as Texas and Minnesota, as far south as Florida, and north to New York.
- (b) Approximate cost, if any, to transport originally.
Approximately \$600,000.
- (c) Commissary expense in excess of income.
\$78,000 to November 1, 1918.
- (d) What rate was charged for meals?
\$0.33½ per meal.
- (e) Daily transportation allowance, if any.
From the beginning of the job to August 7, \$0.20 daily allowance was made to cover carfare to and from the city. Since August 7 this allowance has been discontinued.
- (f) Quantity of common labor in percentage to requirements. In order to have completed the job under the original schedule would have required a total force of 10,500 men from January 18 to October 15, force gradually tapering off after the latter date. The maximum number of laborers on the job at any time was approximately 9,400. Up until recently have averaged 75 per cent of requirements.
- (g) Quantity of skilled labor in percentage to requirements.
At all times had all skilled labor which could be worked economically in connection with the amount of common labor, and if common labor had been forthcoming could have secured enough skilled labor to have maintained a balanced organization.

130. Labor—Continued.

(h) If short, effect on speed and economy.

Shortage of labor slowed down the job so that it will not be completed until four or five months after the time originally set.

(i) Wages—How fixed and by whom paid?

Prior to the formation of the War Labor Policies Board the wages were fixed by the board of control, War Construction Activities, Hampton Roads district. Since the formation of the War Labor Policies Board all rates have been fixed by that board. Wages are paid by the general contractor.

(j) Rates. (See form below.)

Table of wage rates at commencement of project Jan. 18, 1918.

[S. T. means straight time; T. & ½ means time and a half; D. T. means double time.]

Trade.	Rate per hour or week.	Basic hours per day.	Hours worked per day.	Rate.		Changes in rates since beginning of project.
				Satur-day after-noon.	Sunday.	
Barracks attendants.....	\$0.30	10	10	S. T.	S. T.	\$0.30 to \$0.40
Blacksmiths.....	.54	11	10	S. T.	D. T.	.59 to .72½
Blacksmiths' helpers.....	.30	11	10	S. T.	T. & ½	.30 to .46
Bricklayers.....	.75	12	10	D. T.	D. T.	.75 to .87½
Bus boys.....						
Carpenters.....	.53	11	10	D. T.	D. T.	.59 to .75
Carpenters, foremen.....	.62½	11	10	D. T.	D. T.	.65 to .85
Cement masons.....	.65	11	10	S. T.	T. & ½	.60 to .65
Chauffeurs, truck.....	.30	11	10	S. T.	T. & ½	.40 to .45
Chauffeurs, touring.....	.30	11	10	S. T.	T. & ½	.30 to .35
Chefs.....	(1)					
Cooks.....	(1)					
Concrete laborers.....	.30	11	10	S. T.	T. & ½	.35 to .40
Dishwashers.....	20.00	12	12	S. T.	S. T.	12.00 to 20.00
Electricians.....	.56	12	10	D. T.	D. T.	.56 to .75
Electricians' helpers.....	.30	11	10	D. T.	D. T.	.30 to .45
Electricians, foremen.....	.62½	12	10	D. T.	D. T.	.62½ to .85
Engineers, gas engines.....	.50	11	10	S. T.	T. & ½	.50 to .55
Engineers, stationary.....	.59	11	10	S. T.	T. & ½	.59 to .72½
Engineers, steam roller.....	.63½	11	10	S. T.	T. & ½	.63½ to .72½
Hod carriers.....	.36	11	10	T. & ½	T. & ½	.36 to .50
Kitchen men.....	20.00	12	12	S. T.	S. T.	12.00 to 20.00
Laborers.....	.30	11	10	S. T.	T. & ½	.30 to .45
Labor foremen.....	.50	11	10	S. T.	T. & ½	.50 to .60
Linemen.....	.56	12	10	D. T.	D. T.	.56 to .75
Machine operators.....	.59	11	10	S. T.	D. T.	.59 to .72½
Machine operators' helpers.....	.33	11	10	S. T.	T. & ½	.33 to .46
Mechanics.....	.59	11	10	S. T.	D. T.	.59 to .72½
Mechanics, foremen.....	.70	11	10	S. T.	D. T.	.70 to .82½
Pipe layers.....	(2)	11	10	S. T.	T. & ½	.60
Pipe layers, foremen.....	(2)	11	10	S. T.	T. & ½	.80
Pipe calkers.....	.40	11	10	S. T.	T. & ½	.40 to .75
Plumbers.....	.62½	12	10	D. T.	D. T.	.62½ to .75
Plumbers' helpers.....	.30	12	10	D. T.	D. T.	.30 to .37½
Plumbers, foremen.....	.67½	12	10	D. T.	D. T.	.67½ to .85
Pipe coverers.....	.55	11	10	S. T.	S. T.	.55 to .55
Policemen.....	.30	11	10	S. T.	T. & ½	.30 to .45
Stablemen.....	.30	11	10	S. T.	T. & ½	.30 to .40
Stablemen, foremen.....	.45	11	10	S. T.	T. & ½	.45 to .45
Steamfitters.....	.62½	12	10	D. T.	D. T.	.62½ to .75
Steamfitters' helpers.....	.37½	12	10	D. T.	D. T.	(3)
Steamfitters, foremen.....	.67½	12	70	D. T.	D. T.	.67½ to .85
Steam shovel men.....	.65	11	10	S. T.	T. & ½	.65 to .85
Structural iron workers.....	(2)	12	10	D. T.	D. T.	.80
Structural iron workers, foremen.....	(2)	12	10	D. T.	D. T.	.90
Sheet-metal workers.....	.53	12	10	D. T.	D. T.	.53 to .75
Sanitary men.....	.30	11	10	S. T.	T. & ½	.30 to .42½
Watchmen.....	.30	11	10	S. T.	T. & ½	.30 to .45
Water boys.....	.16	11	10	S. T.	T. & ½	.16 to .16
Waiters.....	12.00	12	12	S. T.	S. T.	12.00 to 20.00
Waiters, officers' mess.....	12.00	12	12	S. T.	S. T.	12.00 to 20.00

1 Monthly basis.

2 No rate.

3 Changed time and one-half to double.

130. Labor—Continued.

(k) Conditions.

The charge of \$0.33½ per meal, or \$1 a day, conveys with it sleeping accommodations. In maintaining this price it has been our opinion that we could well afford to incur considerable loss in order to cut down the turnover and save the cost of transporting labor as secured through the United States Employment Service. In our opinion the living and boarding accommodations have been among the best ever provided on work of this kind.

140. Land and land improvements.

(a) Acreage.

Area originally purchased consisted of 524.2 acres dry ground. Through dredging and filling operations this has now been increased to 741.7 acres, with riparian rights of 170.7 acres, making the total area 912.4 acres.

(b) Terms of occupancy.

Purchased by the United States. This purchase has been completed with the exception of the right of way for the railroad yard east of Maryland Avenue and that portion of the golf links on the east side of Maryland Avenue, payment for which has not been made.

150. Physical property.

(a) Percentage completed.

Seventy-eight per cent.

(b) Comparison of total authorization to total cost.

Can not be determined until project is complete.

(c) Unit cost, data, and comparisons.

Reports are in the course of preparation and will be forwarded under separate cover.

(d) Classified cost.

Job not finished.

(e) Economy.

In our opinion the efficiency of labor on this project, considering the condition of the times, has been remarkable, and do not believe in peace times the job could have been carried out in a more economical manner, speed and war prices being considered.

(f) Speed.

Original construction schedule showed completion of plant by January 1, 1919, but owing to the impossibility of securing sufficient labor, the schedule could not have been maintained even if the war had continued. The outbreak of influenza and the signing of the armistice decreased the construction speed fully 50 per cent.

(g) Give date project partially occupied.

Warehouse 3 turned over by letter to commanding general, port of embarkation, October 16, 1918. Formal turnover of no buildings had been made on November 1.

(h) Date project completely occupied.

Project not complete.

(i) Date contractor's last employee left job.

Project not complete.

(j) Date of final audit by United States Treasury.

Project not complete.

(k) Date of final settlement with contractor.

Project not complete.

150. Physical property—Continued.

(1) Unsettled accounts:

1. Constructing quartermaster's suspensions.
Project not complete.
2. Contractors.
Project not complete.
3. Other parties.
Project not complete.

160. Health and vital statistics.

Health of both military and civilian employees on this reservation from the beginning of the work in January to November 1, 1918, has been uniformly good. Comparatively little sickness of any kind has occurred. The two or three cases of malaria noticed were imported. Two cases of typhoid only occurred. There have been seven killed by accident, two drowned, and up to the time of the incidence of influenza only five deaths from sickness. There were during September and October 656 cases of influenza, with 37 deaths.

170. Operation and maintenance.

Project has not been in operation long enough to make a consistent statement.

It is our understanding that maintenance will be handled by the utilities department of the Construction Division of the Army.

180. Pertinent reports, data, maps, etc.

There are attached herewith a short statement from the field auditor showing organization chart and a few pertinent remarks pertaining to the personnel of his organization; a brief statement of the general organization under which the work is handled; a statement by the supervising engineer showing in addition to his organization chart a brief outline of the manner in which all forms are handled; a statement from the field auditor including copies of principal manuals of instruction and a detailed statement of the manner in which all forms are handled; copy of report to Senator Kenneth McKellar of September 23, 1918; the report of the executive officer of the constructing quartermaster's staff showing in detail the manner in which forms and routine business are handled through the constructing quartermaster's office; a statement from the chief timekeeper outlining the detail of the organizations and working of the time-keeping department.

MILLARD A. BUTLER,
Colonel, Quartermaster Corps.

EXHIBIT No. 7.

List of ordnance facilities contracts involving construction work paid for by the United States Government, exclusive of work done at ordnance storage depots, proving grounds, and arsenals.

Contractors.	Location.	Description of construction.	Cost.
Alliance Gas & Power Co.	Alliance, Ohio.	Addition to power plant.	\$125,000.00
American Brake Shoe & Foundry Co.	Erie, Pa.	Complete howitzer plant (plant C).	1,043,968.96
Do.	do.	Complete machining plants; also permanent and temporary houses (plants A and B).	1,787,829.84
American Cau Co. (Liberty Ordnance Plant).	Bridgeport, Conn.	Changes and improvements in plant.	58,000.00
American Car & Foundry Co.	Depew, N. Y.	New buildings and additions to shops.	1,302,000.00
American Clay & Machinery Co.	Kensington, Ill.	Additional manufacturing buildings.	122,500.00
American Motor Truck Co. (subcontracted from Pittsburgh Iron & Steel Foundries).	Newark, Ohio.	Wooden buildings.	10,000.00
American Steel Foundries.	Indiana Harbor, Ind.	Office building extension to forges shop, pump house, etc.	429,240.42
Astoria Light, Heat & Power Co. (Bartlett-Hayward Co.).	Queens, New York City	Complete toluol recovery plant.	2,407,600.00
Atlantic Loading Co.	Amatol, N. J.	Complete shell-loading plant.	12,021,813.22
Atlas Powder Co.	Perryville, Md.	Complete ammonium nitrate plant.	3,700,000.00
Do.	do.	Complete manufacturing plant contemplated; only preliminary work done.	4,10,000.00
Do.	Reynolds, Pa.	Experimental plant.	79,376.50
Barrett Co.	Frankfort, Pa.	Complete manufacturing plant.	251,884.22
Bartlett-Hayward Co.	Baltimore, Md.	New manufacturing buildings and additions at main plant and park plant.	2,792,425.73
Bethlehem Loading Co.	Mays Landing, N. J.	Complete shell-loading plant.	7,916,287.77
Do.	New Castle, Del.	Storage buildings, cafeteria, change house, dispensary, etc.	4,750,000.00
Bethlehem Steel Co.	Bethlehem, Pa.	Complete plant and equipment.	1,158,128.00
Birmingham By-Products Co.	Birmingham, Ala.	By-product coke oven plant.	4,317,300.00
Boston Consolidated Gas Co. (Bartlett-Hayward Co.).	Everett, Mass.	Complete toluol recovery plant.	2,118,800.00
Bridgeport Gas Light Co. (Bartlett-Hayward Co.).	Bridgeport, Conn.	do.	2,37,200.00
Brooklyn Union Gas Co. (Bartlett-Hayward Co.):			
Citizens' Plant.	Brooklyn, N. Y.	Complete toluol plant.	2,121,600.00
Fulton Plant.	do.	Complete toluol recovery plant.	2,124,800.00
Metropolitan Plant.	do.	do.	2,188,800.00
Hassau Plant.	do.	do.	2,187,200.00
Williamsburg Plant.	do.	do.	2,187,200.00
Buckeye Steel Castings Co.	Columbus, Ohio.	Additional forging plant.	119,419.34
Bullard Engineering Works.	Fairfield, Conn.	Complete manufacturing plant.	1,447,000.00
Calco Chemical Co.	Boundbrook, N. J.	do.	4,2,500,000.00
California Loading Co.	Oldbridge, N. J.	Complete plant for loading fuses, adapters, boosters, grenades, etc.	1,750,000.00
Cambridge Gas Light Co. (H. Koppers Co.).	Cambridge, Mass.	Complete toluol recovery plant contemplated; work not started. ....	.....
Central Union Gas Co. (H. Koppers Co.).	New York, N. Y.	Complete toluol recovery plant.	2,46,000.00
Coal Products Manufacturing Co. (Wilputte Coke Oven Corporation).	Joliet, Ill.	do.	2,42,600.00

¹ Original estimate of cost.

² Toluol plants. Figures are based on total cost of each plant furnished by the Toluol Unit in New York district and upon percentages of costs of buildings, etc., also furnished by that unit and based upon careful analysis of costs of typical plants of each of the three constructing contractors, Bartlett-Hayward Co., H. Koppers Co. and Wilputte Coke Oven Corporation.

³ Original estimate including equipment.

⁴ Estimated actual cost.

NOTE.—Costs shown cover, as nearly as can be determined, buildings and fixtures, together with heating, lighting, and such utilities as are a part of the buildings, and are taken from figures reported by the various district ordnance offices and approximately as of Mar. 1, 1919, unless otherwise indicated. Following symbols are used to show certain special conditions:

List of ordnance facilities contracts involving construction work paid for by the United States Government, exclusive of work done at ordnance storage depots, proving grounds, and arsenals—Continued.

Contractors.	Location.	Description of construction.	Cost.
Consolidated Gas Co. (H. Koppers Co.).	New York, N. Y.....	Complete toluol recovery plant.	² \$70,800.00
Cribben & Sexton Co.....	Chicago, Ill.....	Complete manufacturing plant.	266,703.00
Caron Bros.....	Montreal, Canada.....	Additional manufacturing buildings.	680,000.00
Crown Cork & Seal Co.....	Baltimore, Md.....	do.	361,833.75
Curtis & Co. Manufacturing Co.	St. Louis, Mo.....	Purchase of contractor's shell-forging plant and changes in same.	30,000.00
Dayton Ohio Production Co.....	Dayton, Ohio.....	Some small buildings.....	24,174.76
Denver Gas & Electric Co. (H. Koppers Co.).	Denver, Colo.....	Complete toluol recovery plant.	² 17,500.00
Detroit City Gas Co. (H. Koppers Co.).	Detroit, Mich.....	do.	² 60,000.00
Detroit Shell Co.....	do.	Additional manufacturing plant.	150,000.00
Dodge Bros.....	Hamtramck, Mich.....	Complete manufacturing plant.	2,000,000.00
Domestic Coke Corporation.....	Cleveland, Ohio.....	By-product coke ovens.....	⁴ 27,712.80
Do.....	Fairmont, W. Va.....	do.	⁴ 350,000.00
Dominion Copper Products Co.	LaCibine, Quebec, Canada.	Small buildings.....	34,730.00
Donner Union Coke Corporation.	Buffalo, N. Y.....	Complete toluol recovery plant.	² 816,700.00
DuPont Engineering Co.....	Nashville, Tenn.....	Complete smokeless-powder plant.	⁴ 47,500,000.00
Do.....	Pennmanville, Va.....	Complete shell-loading plant, including housing.	⁴ 6,750,000.00
Do.....	Racine, Wis.....	Complete manufacturing plant.	² 11,000,000.00
Edgewater Steel Co.....	Oakmont, Pa.....	Additional manufacturing buildings.	57,637.32
Elizabethtown Gas Light Co. (Wilputte Coke Oven).	Elizabeth, N. J.....	Complete toluol recovery plant.	² 21,400.00
Evens Engineering Corporation.	Oldbridge, N. J.....	Miscellaneous plant additions.	⁴ 50,000.00
General Petroleum Corporation.	Vernon, Calif.....	Complete toluol recovery plant.	² 142,074.73
T. A. Gillespie Co.....	Parlin, N. J.....	Miscellaneous small buildings.	⁴ 25,000.00
Do.....	South Amboy, N. J.....	Complete shell-loading plant.	² 9,500,000.00
Grant Motor Car Corporation.	Findlay, Ohio.....	New buildings and alterations to exist in plant.	124,823.76
Hall Printing Press Co.....	Dunellen, N. J.....	Additional manufacturing buildings.	65,000.00
Harrisburg Manufacturing & Boiler Co.....	Harrisburg, Pa.....	Temporary buildings.....	25,000.00
Frank Hemingway (Inc.).....	Boundbrook, N. J.....	Contract turned over to Chemical Warfare Service.	-----
Heppenstall Forge & Knife Co..	Pittsburgh, Pa.....	Complete manufacturing plant.	340,555.00
Hercules Powder Co.....	Hercules, Calif.....	do.	² 4,200,000.00
Do.....	Nitro, W. Va.....	Complete manufacturing plant, including housing.	⁴ 13,000,000.00
Hess Steel Corporation.....	Baltimore, Md.....	Furnace building, additions to other buildings.	191,130.72
Hooker Electro Chemical Co....	Niagara Falls, N. Y....	Complete picric-acid plant....	² 300,000.00
Hydraulic Pressed Steel Co....	Cleveland, Ohio.....	Forging building and other small buildings.	709,500.00
Illinois Zinc Co.....	Penn, Ill.....	Complete manufacturing plant.	250,000.00
Indiana Fiber Products Co.....	Marion, Ind.....	Small buildings.....	7,612.25
International Coal Products Co.	Clinchfield, Va.....	Complete carboccal distillation plant.	⁴ 466,000.00
International Harvester Co....	Chicago, Ill.....	Small buildings.....	4,000.00
Kerr & Goodwin Machine Co....	Brantford, Ontario, Canada.	Additional manufacturing buildings.	168,624.80
Kings County Lighting Co. (Wilputte Coke Oven Corporation).	Brooklyn, N. Y.....	Complete toluol recovery plant.	² 25,000.00
Lanston Monotype Machine Co.	Philadelphia, Pa.....	Additional buildings.....	150,000.00
Leaside Munitions Co.....	Leaside, Ontario, Canada.	do.	677,636.19
E. Leonard & Sons.....	London, Ontario, Canada.	do.	13,147.00

² Toluol plants. Figures are based on total cost of each plant furnished by the Toluol Unit in New York district and upon percentages of costs of buildings, etc., also furnished by that unit and based upon careful analysis of costs of typical plants of each of the three constructing contractors, Bartlett-Hayward Co., H. Koppers Co., and Wilputte Coke Oven Corporation.

³ Original estimate including equipment.

⁴ Estimated actual cost.

List of ordnance facilities contracts involving construction work paid for by the United States Government, exclusive of work done at ordnance storage depots, proving grounds, and arsenals—Continued.

Contractors.	Location.	Description of construction.	Cost.
John T. Lewis & Bros. Co.....	Baltimore, Md.....	Additional buildings.....	\$125,000.00
McMyler Interstate Co.....	Bedford, Ohio.....	General plant extensions.....	90,000.00
Martin-Rockwell Loading Co....	Port Penn, Del.....	Complete plant for loading drop bombs.....	36,000,000.00
Meade Morrison Manufacturing Co.....	Gloucester, Mass.....	New building.....	41,000.00
Mesta Machine Co.....	Pittsburgh, Pa.....	Additional manufacturing buildings.....	308,185.66
Midvale Steel & Ordnance Co.....	Eddystone, Pa.....	Miscellaneous buildings.....	210,899.40
Do.....	Nicetown, Pa.....	Extensions to present buildings and new manufacturing buildings.....	1,124,424.81
Minneapolis Steel & Machinery Co.....	Minneapolis, Minn.....	Additional manufacturing buildings.....	683,350.15
Moon Motor Car Co.....	St. Louis, Mo.....	do.....	131,319.64
Morgan Engineering Co.....	Alliance, Ohio.....	Complete new manufacturing plant.....	1,862,676.97
Mosler Safe Co. (American Rolling Mill Co.).....	Hamilton, Ohio.....	Rearrangement of commandeered plant of Mosler Safe Co.....	130,000.00
Mount Wilson Solar Observatory.....	Pasadena, Calif.....	Buildings for manufacturing and training school purposes.....	22,695.00
Municipal Gas Co. (Wilputte Coke Oven Corporation).....	Albany, N. Y.....	Complete toluol recovery plant.....	21,420.00
National Zinc Separating Co.....	Cuba City, Wis.....	Complete manufacturing plant.....	694,006.60
New Amsterdam Gas Co. (Bartlett Hayward Co.).....	New Amsterdam, New York City.....	Complete toluol recovery plant.....	2183,200.00
New Haven Gas Light Co. (H. Koppers Co.).....	New Haven, Conn.....	do.....	24,200.00
New Home Sewing Machine Co.....	Orange, Mass.....	New manufacturing buildings.....	325,000.00
New Orleans Gas Light Co. (H. Koppers Co.).....	New Orleans, La.....	Complete toluol recovery plant.....	214,800.00
Newport Mining Co.....	Carro'sville, Wis.....	Complete manufacturing plant.....	254,917.72
New York Airbrake Co.....	Watertown, N. Y.....	A large amount of manufacturing equipment was furnished this contractor. Any buildings erected were only partially paid for by United States through partial mortization allowances and remain contractor's property.....	
New York Mutual Gas Light Co. (H. Koppers Co.).....	New York, N. Y.....	Complete toluol recovery plant.....	246,000.00
Nixon Nitration Works.....	Perth Amboy, N. J.....	Storehouse.....	10,000.00
Northwestern Ordnance Co. (Gieshold Machine Co.).....	Madison, Wis.....	Complete manufacturing plant.....	450,160.53
Ohio Chemical Co.....	Cleveland, Ohio.....	Experimental plant.....	5,000.00
Otis Elevator Co.....	New York, N. Y.....	Additional buildings.....	215,155.52
O'Bannon Corporation.....	West Barrington, R. I.....	Additional manufacturing buildings.....	50,000.00
Pembroke Iron Works.....	Pembroke, Ontario, Canada.....	do.....	108,745.02
Pressed Steel Car Co.....	Hegewisch, Ill.....	New manufacturing buildings and additions.....	280,000.00
Do.....	McKees Rocks, Pa.....	Additional manufacturing buildings.....	11,601.37
Providence Gas Co. (H. Koppers Co.).....	Providence, R. I.....	Complete toluol recovery plant.....	233,700.00
Pneuman Co.....	Chicago, Ill.....	Plant additions.....	160,252.11
Railway & Industrial Engineering Co.....	Greensburg, Pa.....	Fuel, oil, storage, etc.....	1,822.55
Remington Arms UMC Co.....	Bridgeport, Conn.....	Additional buildings.....	800,000.00
Do.....	Hoboken, N. J.....	Small buildings and rearrangement of commandeered plant.....	42,000.00
Root & Vandervoort Engineering Co.....	East Moline, Ill.....	Heat-treating equipment.....	27,820.38
Rockwood Sprinkler Co.....	Worcester, Mass.....	Additional manufacturing buildings.....	35,000.00
Savage Arms Corporation.....	Utica, N. Y.....	Additional plant buildings.....	809,706.00
Scriffin Steel Co.....	St. Louis, Mo.....	Additional plant and miscellaneous buildings.....	372,425.80

² Toluol plants. Figures are based on total cost of each plant furnished by the Toluol Unit in New York district and upon percentages of costs of buildings, etc., also furnished by that unit and based upon careful analysis of costs of typical plants of each of the three constructing contractors, Bartlett-Hayward Co., H. Koppers Co. and Wilputte Coke Oven Corporation.

³ Original estimate including equipment.

List of ordnance facilities contracts involving construction work paid for by the United States Government, exclusive of work done at ordnance storage depots, proving grounds, and arsenals—Continued.

Contractors.	Location.	Description of construction.	Cost.
Seatt'e Lighting Co. (H. Koppers Co.).	Seattle, Wash.....	Complete toluol recovery plant	² \$13,700.00
Singer Manufacturing Co.....	Elizabethport, N. J.....	Additional plant	1,500,000.00
Standard Forgings Co.....	Indiana Harbor, Ind....	Complete manufacturing plant	803,687.64
Standard Gas Light Co. (H. Koppers Co.).	New York, N. Y.....	Complete toluol recovery plant	² 39,200.00
Standard Oil Co.....	Point Richmond, Calif.....	do	260,000.00
Standard Sanitary Manufacturing Co.	Pittsburgh, Pa.....	Fuel, oil, storage, heat treating, etc.	20,086.73
Standard Steel Car Co.....	Hammond, Ind.....	Complete manufacturing plant.	852,000.00
Standard Steel Car Co. (Osgood Bradley Car Co.).	Worcester, Mass.....	Small buildings	10,000.00
Standard Steel Works.....	Burnham, Pa.....	Plant extensions	336,479.84
Studebaker Corporation.....	South Bend, Ind.....	do	105,600.00
do	do	Complete manufacturing plant.	915,000.00
Symington-Anderson Co.....	Rochester, N. Y.....	do	958,859.00
Symington-Anderson Corporation.	Chicago, Ill.....	do	3,320,350.25
Symington Machine Corporation (American International Corporation).	Rochester, N. Y.....	do	857,275.00
Symington Machine Corporation.	do	do	519,411.00
Tacony Ordnance Corporation.	Tacony, Pa.....	do	967,798.00
Templar Motors Corporation...	Cleveland, Ohio.....	Small buildings	2,600.00
Tennessee Coal, Iron & Railroad Co.	Fairfield, Ala.....	Complete by-product coke-oven plant.	³ 780,000.00
Twin City Forge & Foundry Co.	Stillwater, Minn.....	General plant additions	133,000.00
U. S. Cartridge Co.....	Lowell, Mass.....	Small buildings	30,000.00
U. S. Cast Iron Pipe & Foundry Co.	Bessemer, Ala.....	Machine shop extension	¹ 30,000.00
U. S. Light & Heat Corporation.	Worcester, Mass.....	New buildings	47,000.00
U. S. Steel Corporation.....	Neville Island, Pa.....	Complete manufacturing plant contemplated; only a small portion completed.	⁴ 6,000,000.00
Utica Gas & Electric Co. (Wilputte Coke Oven Corporation).	Utica, N. Y.....	Complete toluol recovery plant.	² 21,400.00
Van Dorn Iron Works Co.....	Cleveland, Ohio.....	New manufacturing buildings and alterations to existing buildings.	199,434.00
Wagner Electric Manufacturing Co.	St. Louis, Mo.....	Additional manufacturing buildings.	70,000.00
Washington Gas Light Co. (H. Koppers Co.).	Washington, D. C.....	Complete toluol recovery plant.	² 25,700.00
Westchester Lighting Co. (Bartlett-Hayward Co.).	Mount Vernon, N. Y.....	do	² 113,200.00
Westinghouse Electric & Manufacturing Co.	Pittsburgh, Pa.....	Miscellaneous plant additions.	25,434.47
Willys-Overland Co.....	Toledo, Ohio.....	Additional manufacturing buildings.	375,000.00
Winslow Bros.....	Chicago, Ill.....	do	202,839.00
Wisconsin Gun Co.....	Milwaukee, Wis.....	Complete manufacturing plant.	310,500.78
Wisconsin Zinc Co.....	New Diggins, Wis.....	do	430,396.47
Worthington Pump & Machinery Co.	Hazleton, Pa.....	Additional manufacturing buildings.	472,842.00
David A. Wright Works.....	Chicago, Ill.....	Small buildings	50,690.74
Total.....			178,916,240.17

² Toluol plants. Figures are based on total cost of each plant furnished by the Toluol Unit in New York district and upon percentages of costs of buildings etc., also furnished by that unit and based upon careful analysis of costs of typical plants of each of the three constructing contractors, Bartlett-Hayward Co., H. Koppers Co. and Wilputte Coke Oven Corporation.

³ Original estimate including equipment.

⁴ Estimated actual cost.

EXHIBIT No. 8.

Handbook of Information—Governmental Boards and Departmental Section Dealing with Labor.

LABOR COMMITTEE OF THE COUNCIL OF NATIONAL DEFENSE.

Samuel Gompers, president American Federation of Labor, chairman.

William B. Wilson, Secretary Department of Labor.

V. Everit Macy, president the National Civic Federation.

James Lord, president mining department, American Federation of Labor.

Elisha Lee, general manager Pennsylvania Railroad Co.

Warren S. Stone, grand chief Brotherhood of Locomotive Engineers.

C. E. Michael, National Association of Manufacturers (president Virginia Bridge & Iron Co.).

Frank Morrison, secretary American Federation of Labor.

Lee K. Frankel, third vice president Metropolitan Life Insurance Co.

James O'Connell, president metal trades department, American Federation of Labor.

Louis B. Schrem, chairman labor committee United States Brewers' Association.

Ralph M. Easley, assistant to Samuel Gompers as chairman of executive committee.

Matthew Woll, assistant to Samuel Gompers as member of Advisory Commission.

Miss Gertrude Beeks, secretary of executive committee.

Subcommittees of Committee on Labor:

Frank Morrison, wages and hours.

V. Everit Macy, mediation and conciliation.

The Council of National Defense, consisting of the Secretary of War, the Secretary of the Navy, the Secretary of the Interior, the Secretary of Agriculture, the Secretary of Commerce, and the Secretary of Labor was created by Public Act No. 242 of the Sixty-fourth Congress, approved August 29, 1916. This act also provided for an Advisory Commission to be appointed by the President. The President appointed Mr. Samuel Gompers to represent labor on the Advisory Commission. Under the direction of Mr. Gompers a labor committee, consisting of approximately 500 persons, has been organized.

LABOR COMMITTEE OF THE WAR INDUSTRIES BOARD.

Hugh Frayne, director, New York representative of the American Federation of Labor, Scranton, Pa.

Mr. Hugh Frayne has been appointed to handle the mediation problems of the War Industries Board. Usually Mr. Frayne submits disputes to other Government agencies for mediation, but occasionally he performs the conciliation work himself. As the work of Mr. Frayne is very informal printed decisions are not available.

NATIONAL WAR LABOR BOARD.

Joint chairmen.

Hon. William H. Taft, professor of law at Yale University, ex-President, New Haven, Conn.

Hon. Frank P. Walsh, lawyer, Kansas City, Mo.

Hon. Frederick N. Judson, vice chairman and alternate for Mr. Taft, lawyer, St. Louis, Mo.

Hon. William Harman Black, vice chairman and alternate for Mr. Walsh, lawyer, New York City.

W. Jett Lauck, secretary Economist, Chevy Chase, Md.

Loyall A. Osborne, vice president Westinghouse Electric Co., New York City.
 C. Edwin Michael, president Virginia Bridge & Iron Co., Roanoke, Va.
 W. H. Van Dervoort, Root & Van Dervoort Engineering Co., East Moline, Ill.
 B. L. Worden, president Submarine Boat Corporation, Newark, N. J.
 F. C. Hood, Hood Rubber Co., Watertown, Mass.
 William W. Johnston, president International Association of Machinists (alternate for Savage, deceased).
 Frank J. Hayes, United Mine Workers of America, Indianapolis, Ind.
 William L. Hutcheson, general president United Brotherhood of Carpenters and Joiners, Indianapolis, Ind.
 Victor A. Olander, Illinois State Federation of Labor, Chicago, Ill.
 T. A. Rickert, United Garment Workers, Chicago, Ill.

Alternates.

Adam Wilkinson, United Mine Workers of America, Indianapolis, Ind. (Hayes).
 T. M. Guerin, United Brotherhood of Carpenters and Joiners, Washington, D. C. (Hutcheson).
 Fred Hewitt, editor Machinists' Union, Washington, D. C. (Johnston).
 H. H. Rice, General Motors Corporation, Detroit, Mich. (Van Dervoort).
 C. A. Crocker, Crocker McElwain Co., Holyoke, Mass. (Worden).
 J. F. Perkins, Calumet & Hecla Mining Co., Boston, Mass. (Hood).
 Matthew Woll, fourth vice president Union Label Trades Department, Washington, D. C. (Olander).
 John J. Manning, secretary-treasurer Union Labor Trades Department, Washington, D. C. (Rickert).
 Joseph W. Marsh, Westinghouse Building, Pittsburgh, Pa. (Michael).

The general policies of the National War Labor Board are fully stated in a pamphlet shown as Appendix 1, which is a part of this handbook.

WAR LABOR POLICIES BOARD.

Felix Frankfurter, chairman, Department of Labor, professor of law, Harvard Law School, Cambridge, Mass.
 G. I. Christie, Department of Agriculture, college professor, Lafayette, Ind.
 Howard Coonley, Emergency Fleet Corporation, president Walworth Manufacturing Co., Boston, Mass.
 M. B. Hammond, Food Administration, economist, Columbus, Ohio.
 John P. White, Fuel Administration, president United Mine Workers of America, Des Moines, Iowa.
 Franklin D. Roosevelt, Assistant Secretary of the Navy.
 L. McH. Howe, Navy Department, newspaper correspondent, New York City.
 W. I. Tyler, Railroad Administration, Northern Pacific Railroad Co., St. Paul, Minn.
 Robert P. Bass, Shipping Board, ex-governor, Peterboro, N. H.
 E. M. Hopkins, War Department, president Dartmouth College, Hanover, N. H.
 Maj. F. W. Tully, alternate, War Department.
 Stanley King, War Department, McElwain Shoe Co., Boston, Mass.
 Hugh Frayne, War Industries Board, New York representative American Federation of Labor, Scranton, Pa.
 Miss Mary Van Kleeck, Women in Industry, secretary Russell Sage Foundation, lecturer for School of Philanthropy, New York.
 George L. Bell, executive assistant, secretary Commission on Philanthropy and Housing of California, San Francisco, Calif.

The general policies of the War Labor Policies Board are fully stated in a pamphlet shown in Appendix 2, which is part of this handbook.

SHIPBUILDING LABOR ADJUSTMENT BOARD.

- V. Everit Macy, chairman, president National Civic Federation, Ossining, N. Y.
 A. J. Berres, secretary-treasurer metal trades department, American Federation of Labor, Washington, D. C.
 L. C. Marshall, Economist, college professor, Chicago, Ill.
 Henry A. Seager, secretary, professor of political economy, Columbia University, Southport, Conn.

The Shipbuilding Labor Adjustment Board was constituted by agreements entered into August 29, 1917, and December 8, 1917, between the Navy Department, the Emergency Fleet Corporation, and certain labor leaders.

"This board deals exclusively with adjustments of wages, hours, and conditions of labor (a) in the construction or repair of those shipbuilding plants for which funds are being provided by the United States Shipping Board Emergency Fleet Corporation of the Navy and (b) in the construction or repair of ships which is carried on under contract with the Emergency Fleet Corporation of the Navy, exclusive of work being done in the navy yards. The board has its own examiners in all districts where shipbuilding is carried on.

In yards that do not deal directly with the union, shop committees are provided to consider grievances. In case of need the board's district examiner should be consulted, and if he finds it impossible to make adjustment he will refer the matter to the board for settlement.

The board has exclusive jurisdiction in the field it covers.

EMERGENCY CONSTRUCTION ADJUSTMENT COMMISSION.

- E. M. Hopkins, chairman, president Dartmouth College, Hanover, N. H.
 Commander Charles E. Parsons, United States Navy.
 Col. J. H. Alexander, Construction Division.
 John R. Alpine, representing labor, acting president American Federation of Labor, La Crosse, Wis.
 Acting chairman, Maj. F. W. Tully.

The Emergency Construction Adjustment Commission fixes wage rates and conditions of labor for workmen employed in the emergency construction of Army work, under the Baker-Gompers and Daniels-Gompers agreements.

The general activities of the Emergency Construction Adjustment Commission are fully stated in pamphlet shown as Appendix 3, which is a part of this handbook.

NATIONAL ADJUSTMENT COMMISSION.

- R. P. Bass, chairman, ex-governor, Peterboro, N. H.
 John G. Palfrey, acting chairman, lawyer, Boston, Mass.
 Louis R. Levy, secretary, formerly secretary to Vice Chairman of United States Shipping Board, Manchester, N. H.
 Stanley King, War Department, McElwain Shoe Co., Boston, Mass.
 E. A. Kelley, vessel operator, New York.
 H. C. Blackston, vessel operator, New York.
 M. J. Sanders, vessel operator, New Orleans, La.
 E. J. Barber, vessel operator, New York.
 R. Freeman, vessel operator, Boston, Mass.
 T. V. O'Connor, president International Longshoremen's Association, Buffalo, N. Y.

This commission adjusts and controls wages, hours, and conditions of labor in the loading and unloading of vessels, both in coastwise service and deep-sea service.

HARNESS AND SADDLERY ADJUSTMENT COMMISSION.

Maj. Samuel J. Rosensohn, War Department, chairman.

William E. Bryan, representing the International Leather Workers' Union, general president United Leather Workers' International Union, Kansas, City, Mo.

Henry Diegel, representing employers, secretary Atchison Saddlery Co., Atchison, Kans.

The National Harness and Saddlery Adjustment Commission fixes wage rates for employees in all those manufactories supplying leather goods and harness and accessories to the Government. This does not include shoes.

RAILROAD WAGE COMMISSION.

Franklin K. Lane, chairman, Secretary of Interior, Washington, D. C.

Charles C. McChord, lawyer, Louisville, Ky.

J. Harry Covington, chief justice, District of Columbia Supreme Court, City Hall, Washington, D. C.

William R. Willcox, lawyer, New York City.

The Railroad Wage Commission was appointed by General Order No. 5 of the United States Railroad Administration on January 18, 1918. The Railroad Wage Commission made its report April 30, 1918, and has since been inactive.

This commission was empowered to make a general investigation of the compensation of persons in the railroad service, the relation of railroad wages to wages in other industries, the conditions affecting wages in different parts of the country, the special emergency affecting wages which exists at this time, owing to war conditions and the high cost of living, as well as the relation between different classes of railroad labor.

BOARD OF RAILROAD WAGES AND WORKING CONDITIONS.

G. H. Sines, chairman, vice president Brotherhood of Railroad Trainmen, New Rochelle, N. Y.

F. F. Gaines, vice chairman, superintendent of motive power of Central Railroad of Georgia, Atlanta, Ga.

J. J. Dermody, vice president Order of Railroad Telegraphy, Cincinnati, Ohio.

C. E. Lindsay, division engineer, maintenance of way department, New York Central Lines, Albany, N. Y.

W. E. Morse, vice president and general manager of the Denver & Salt Lake Railroad Co., Denver, Colo.

A. O. Wharton, president of railroad employee's department, American Federation of Labor, St. Louis, Mo.

J. A. Emmart, secretary, statistician, formerly with Railroad Wage Commission, Beverly, W. Va.

The Board of Railroad Wages and Working Conditions was established by General Order No. 27 of the United States Railroad Administration.

It is the duty of this board to hear and investigate matters presented by employees or their representatives affecting—

(1) Inequalities as to wages and working conditions, whether as to individual employees or classes of employees.

(2) Conditions arising from competition with employees in other industries.

(3) Rules and working conditions for the several classes of employees either for the country as a whole or for different parts of the country.

RAILROAD BOARD OF ADJUSTMENT NO. 1.

Charles P. Neill, chairman, ex-Commissioner Bureau of Labor Statistics, Washington, D. C.

F. A. Burgess, vice chairman, assistant grand chief of Brotherhood of Locomotive Engineers, Franklin, Pa.

W. F. Clark, vice president of Organized Railroad Conductors, Chicago, Ill.

W. N. Doak, vice president Brotherhood of Railroad Trainmen, Roanoke, Va.

J. W. Higgins, secretary Western Managers Bureau, Chicago, Ill.

Albert Phillips, vice president Brotherhood of Locomotive Firemen and Enginemen, Washington, D. C.

John G. Walber, secretary of Eastern Managers' Bureau, New York.

E. T. Whiter, assistant general manager Pennsylvania Lines West, Pittsburgh, Pa.

Railroad Board of Adjustment No. 1 was created by General Order No. 13 of the United States Railroad Administration as a result of an agreement between several regional directors of railroads and several labor leaders.

The Railroad Board of Adjustment No. 1 took over the work of the Commission of Eight in adjusting disputes arising out of the application of the eight-hour law, so far as the affecting of yardmen is concerned.

The Railroad Adjustment Board No. 1 was also empowered to decide on appeal disputes over personal grievances.

The Railroad Board of Adjustment No. 1 does not publish its decisions, which are distributed only to the Director General of Railroads, the Director of the Division of Labor of the United States Railroad Administration, the chief operating officer of the railroad affected, the regional directors and the chief executive officers of the labor unions involved.

RAILROAD BOARD OF ADJUSTMENT NO. 2.

E. F. Potter, chairman, assistant to general manager of the Soo Lines, Minneapolis, Minn.

F. P. McNulty, vice chairman, president of International Brotherhood of Electrical Workers, Newark, N. J.

A. C. Adams, superintendent of shops, New York, New Haven & Hartford Railroad, Readville, Mass.

H. J. Carr, member of executive board of International Association of Machinists, Kansas City, Mo.

Otto E. Hoard, vice president of the Amalgamated Sheet Metal Workers' International Alliance, Washington, D. C.

F. H. Knight, assistant to president of Brotherhood of Railway Car Men, St. Louis, Mo.

W. S. Murrian, superintendent of motive power of Southern Railway, Knoxville, Tenn.

W. H. Penrith, assistant to general manager, of Chicago & Alton Railway, Chicago, Ill.

George W. Pring, vice president railroad employees' department American Federation of Labor, Des Moines, Iowa.

E. A. Sweeley, master car builder, Seaboard Air Line, Portsmouth, Va.

R. J. Turnbull, inspector of transportation, Atlantic Coast Line Railroad, Wilmington, N. C.

G. C. Van Dornes, vice president of International Brotherhood of Blacksmiths and helpers, Chicago, Ill.

Railroad Board of Adjustment No. 2 was created by Railroad Administration, General Order No. 29.

Its duties are further defined by United States Railroad Administration Circular No. 38.

Railroad Board of Adjustment No. 2 does not distribute printed decisions.

Railroad Board No. 2 renders decisions on all matters in dispute affecting shop employees growing out of the interpretation or application of the provisions of the wage schedules or agreements which are not promptly adjusted by the officials and

the employees on any one of the railroads operated by the Government as referred to in General Order No. 29.

ARSENALS AND NAVY YARDS COMMISSION.

Franklin D. Roosevelt, assistant to Secretary of the Navy.

This commission was established under authority of the Secretary of War and the Secretary of the Navy, with the Assistant Secretary of the Navy, Franklin D. Roosevelt, as chairman. The commission was to take jurisdiction in all cases that could not be settled by representatives of the Army and Navy. Maj. B. H. Gitchell, of the office of the Secretary of War, handled the wage adjustments in the arsenals and Mr. Louis McH. Howe, confidential assistant to Mr. Roosevelt, arranged the new scales in the navy yards. Their work having been successfully accomplished in the individual cases, there was never any need for reference to the commission.

UNITED STATES BOARD OF MEDIATION AND CONCILIATION.

Martin A. Knapp, chairman, judge, Syracuse, N. Y.

William L. Chambers, commissioner, lawyer, Sellman, Md.

W. W. Hanger, assistant commissioner, statistician, New York City.

William H. Smith, secretary, assistant secretary to William L. Chambers on the Spanish Treaty Claims Commission, and later assistant secretary of American Canadian Boundary Commission.

By chapter 6 of the acts of the Sixty-third Congress, first session, provisions were made for the appointment of the United States Board of Mediation and Conciliation to have jurisdiction over labor disputes in connection with railroads.

Although there are over 2,700 railroads in the United States, less than 200 were taken over by the United States Government when control was assumed. Since that time the United States Board of Mediation and Conciliation has been more than ever active due to the numerous controversies and demands which are made by the hundreds of roads not under Government control.

PRESIDENT'S MEDIATION COMMISSION.

W. B. Wilson, Secretary of Labor, chairman.

Ernest P. Marsh, president of State Federation of Labor of State of Washington, Washington, D. C.

Berner Z. Reed, mine and oil operator, Denver, Colo.

Jackson L. Spangler, coal operator, Bellefonte, Pa.

John H. Walker, president Illinois State Federation of Labor, Danville, Ill.

Felix Frankfurter, secretary and counsel, professor of law, Harvard Law School, Cambridge, Mass.

Max Lowenthal, assistant secretary, lawyer, New York City.

The President's Mediation Commission was appointed by Executive order in September, 1917, to examine the general causes of industrial instability and to make recommendations as to the direction of the labor policy of the United States. The President's Mediation Commission made two reports, the first on November 6, 1917, devoted entirely to the Bisbee deportations; the second report submitted January 9, 1918, containing a summary statement of the results in the specific labor adjustments undertaken by the commission, an analysis of the difficulties and tendencies making for industrial instability, and recommendations for the formation of a national war labor policy.

DEPARTMENTAL SECTIONS.

- (1) *Office of the Secretary of War.*—E. M. Hopkins, assistant to the Secretary of Labor, president Dartmouth College, Hanover, N. H. Maj. F. W. Tully, acting, in charge, 229 State, War, and Navy Building.

(2) *Army Ordnance, Industrial Service Section*.—Ordnance Building B, Seventh and B Streets. Maj. B. H. Gitchell, chief.

The Industrial Service Section has charge for the Ordnance Department of all matters pertaining to labor engaged in the production of Ordnance supplies, equipment, and material, including arsenals. This is intended to cover specifically all subjects concerning hours of labor, rates of pay, housing, transportation, dilution, women in industry, community conditions affecting labor, stealing of employees, and prevention of wage or other labor disputes, supply and distribution, as being essential to Ordnance production, relations on the above matters with the Industrial Service Sections of other procurement bureaus, with the office of the Secretary of War, the Department of Labor, the Public Health Service on matters affecting health, safety, and sanitation, and all other agencies dealing with labor. All such matters are referred to the Industrial Service Section and are handled by such section either directly or through other appropriate agencies of the Government.

(3) *Bureau of Aircraft Production, Industrial Relations Section*.—Building D, Four and a half and Missouri Avenue. Maj. B. H. Gitchell, chief.

The Industrial Relations Section has charge for aircraft of all matters pertaining to labor engaged in the production of aircraft. This is intended to cover specifically hours of labor, rates of pay, housing, dilution, women in industry, community conditions affecting labor, stealing of employees, the prevention of wage or other labor disputes, and supply and distribution.

(4) *Construction Division, War Department, Industrial Service Section*.—Building C, Seventh and B Streets. Maj. H. F. Mayer, acting chief.

The Emergency Construction Commission fixes wage rates for working men employed in the emergency construction of Army camps and is also active in all construction work for the War Department. It was previously the Cantonment Adjustment Commission. This board is bound in its activities by the Baker-Gompers agreement which controls wages, hours, and conditions of labor on Government construction work.

(5) *Quartermaster's Department, Industrial Relations Branch*.—Unit G, 3506 Potomac Park. John R. McLane, in charge, lawyer, Manchester, N. H.

This branch, organized in February, 1918, is responsible for the settlement of labor disputes and for working conditions in plants carrying quartermaster contracts, with the exception of needle trades. It is mainly occupied with the adjustment of disputes.

(6) *Quartermaster's Department, Board of Control*.—109 East Sixteenth Street, New York City. Dr. William Z. Ripley, administrator of labor standards, Economist, Newton Center, Mass.

This administration was organized in January, 1918, by order of the Quartermaster General to carry on the work of the Board of Control of labor standards and Army clothing. Appointed August, 1917, by Secretary of War. It is charged with the settlement of labor disputes and with inspection for conditions of safety and sanitation in factories of needle trades contracting for the Quartermaster Corps.

(8) *United States Shipping Board Emergency Fleet Corporation, Industrial Relations Group*.—140 North Broad Street, Philadelphia. Dr. L. C. Marshall, director, Economist, Chicago, Ill.

Industrial Service Section: The Industrial Service Section offers counsel and advice along the lines of scientific employment and administers draft deferments, transfers, and similar matters related to the handling of the personnel in shipyards.

Health and Sanitation Section: This section offers expert assistance in all matters affecting the health and physical welfare of the workers in shipyards. It will gladly cooperate with shipyard communities in such matters and should be immediately consulted in cases of threatened epidemics or spread of contagious

diseases. The section has representatives in the various shipbuilding districts, whose assistance can be obtained on short notice.

Safety Engineering Section: The Safety Engineering Section gives close attention to the matter of safety of the workmen engaged in building ships and ship material. Its representatives are qualified to give constructive assistance in matters of machine guards, safety devices of various kinds, and will help in the institution of safety campaigns among the workmen themselves.

Education and Training Section: It is the function of this section to inaugurate training centers throughout the country where men may be trained for shipyard work and men already in the shipyards may be given more advanced training. This section is working in the closest cooperation with the shipbuilders and every effort is being made to bring about results of a practical nature.

Labor Administration Section: The Labor Administration Section is a department for advice and counsel in the proper handling of disputes between employer and worker, especially in plants producing ship accessories. While not organized for the purpose of arbitration, it is often able to counsel those interested in such a manner as to avoid loss of time through strikes or lockouts. In case of need, it is the enforcing agency of the Shipbuilding Labor Adjustment Board.

- (9) *United States Housing Corporation, Bureau of Industrial Housing and Transportation, Industrial Relations Division.*—613 G Street. Dr. Frank J. Warne, manager, Economist, Cosmos Club, Washington, D. C.

Dr. Warne, as director, is called upon to fix wage rates for all classes of labor employed on housing projects. Each contract includes a provision requiring the payment of prevailing rates in the community for all labor employed. These rates are determined from material secured from the local representatives of the United States Public Employment Service. When prevailing rates are determined by Dr. Warne he reports them to the contractors as the wage rates to be paid on the contract.

- (10) *United States Department of Labor, Division of Conciliation.*—Department of Labor Building, room 735. H. L. Kerwin, director, bank clerk for secretary to Secretary Wilson, Wellsboro, Pa.

By section B of chapter 141 of the Public Laws of the Sixty-second Congress it is provided that:

"The Secretary of Labor shall have power to act as mediator and to appoint commissioners of conciliation in labor disputes whenever in his judgment the interests of industrial peace may require it to be done; and all duties performed and all power and authority now possessed or exercised by the head of any executive department in and over any bureau, officer, board, branch, or division of the public service by this act transferred to the Department of Labor, or any business arising therefrom or pertaining thereto, or in relation to the duties performed by and authority conferred by law upon such bureau, officer, office, board, branch, or division of the public service, whether of an appellate or revisory character or otherwise, shall hereafter be vested in and exercised by the head of the said Department of Labor."

The Division of Conciliation sends its conciliators out into the field on request of employers or employees, or both, to settle strikes or to prevent threatened disputes from turning into strikes. The conciliators do not, however, fix wage rates, except in the comparatively few cases where both sides to the disputes voluntarily agree to accept a wage award to be made by the mediator.

- (11) *Fuel Administration, Bureau of Labor.*—Fuel Administration Building, Eighteenth and D Streets. Joint heads: John P. White, president United Mine Workers of America, Des Moines, Iowa; Rembrandt Peale, coal operator, St. Benedict, Pa. Assistants: Warren Phippen, organizer United Mine Workers of America, Mulberry, Kans.; T. J. White, advertising manager United Mine Workers of America, Des Moines, Iowa.

The work of the Labor Bureau consists mainly in adjusting disputes over the contracts between miners and operators.

A mediation board consisting of one operator and one miner has been appointed for each district, but the appointments have not yet been announced.

(12) *United States Food Administration*.—Nineteenth and D Streets. M. B. Hammond, director, Economist, Columbus, Ohio.

The United States Food Administration has no industrial-service section as such. Labor matters which come up are referred to M. B. Hammond, representative of the administration on the War Labor Policies Board.

Mr. Hammond refers industrial matters to other Federal departments. Questions which have so far arisen have been requests from agricultural industries and from manufacturers preparing foodstuffs to assist them in securing labor. For example, Cuban sugar planters asked the Food Administration to get laborers outside of Cuba to assist in harvesting the sugar crop, and the sugar-beet growers generally have asked for the modification of the immigration rules so that larger labor supplies could be obtained.

Labor disputes in food-producing establishments are frequently referred to the Food Administration. Because the Food Administration does not make contracts for production, it does not undertake directly to control the employment of labor. Occasionally, however, producers seek to utilize the influence of the Food Administration in securing a relaxation of the State laws limiting the employment of certain classes of persons—such for example, as the convict-labor law and the statutes prohibiting night work for women.

(13) *Navy Department*.—State, War, and Navy Building. Franklin D. Roosevelt, Assistant Secretary of the Navy; Louis McH. Howe, confidential assistant to Mr. Roosevelt.

The Navy Department maintains no formally organized industrial relations branch. Wages in the navy yards are adjusted periodically through the office of Assistant Secretary Franklin D. Roosevelt. In the navy yards the commanding officer or industrial manager is responsible for the conduct of industrial relations. In the outside plants which are working on naval contracts the production inspector is charged with reporting to the department any unrest, actual or imminent. Reports on possible disturbances are obtained also, from the firms involved and trade-union representatives. In case of strike the Navy Department utilizes the most convenient available adjusting agency. The National War Labor Board and the Ship Building Adjustment Board handle many matters for the department.

APPENDIX 1.

NATIONAL WAR LABOR BOARD.

PROCLAMATION BY THE PRESIDENT OF THE UNITED STATES.

Whereas in January, nineteen hundred and eighteen, the Secretary of Labor, upon the nomination of the president of the American Federation of Labor and the president of the National Industrial Conference Board, appointed a War Labor Conference Board for the purpose of devising for the period of the war a method of labor adjustment which would be acceptable to employers and employees; and

Whereas said board has made a report recommending the creation for the period of the war of a National War Labor Board with the same number of members as, and to be selected by the same agencies that created, the War Labor Conference Board, whose duty it shall be to adjust labor disputes in the manner specified, and in accordance with certain conditions set forth in the said report; and

Whereas the Secretary of Labor has, in accordance with the recommendation contained in the report of said War Labor Conference Board, dated March 29, 1918,

appointed as members of the National War Labor Board Hon. William Howard Taft and Hon. Frank P. Walsh, representatives of the general public of the United States; Messrs. Loyall A. Osborne, L. F. Loree, W. H. Van Dervoort, C. E. Michael, and B. L. Worden, representatives of the employers of the United States; and Messrs. Frank J. Hayes, William L. Hutcheson, William H. Johnston, Victor A. Olander, and T. A. Rickert, representatives of the employees of the United States:

Now, therefore, I, WOODROW WILSON, President of the United States of America, do hereby approve and affirm the said appointments and make due proclamation thereof and of the following for the information and guidance of all concerned:

The powers, functions, and duties of the National War Labor Board shall be to settle by mediation and conciliation controversies arising between employers and workers in fields of production necessary for the effective conduct of the war, or in other fields of national activity, delays and obstructions in which might, in the opinion of the National Board, affect detrimentally such production; to provide, by direct appointment, or otherwise, for committees or boards to sit in various parts of the country where controversies arise and secure settlement by local mediation and conciliation; and to summon the parties to controversies for hearing and action by the National Board in event of failure to secure settlement by mediation and conciliation.

The principles to be observed and the methods to be followed by the National Board in exercising such powers and functions and performing such duties shall be those specified in the said report of the War Labor Conference Board, dated March 29, 1918, a complete copy of which is hereunto appended.

The National Board shall refuse to take cognizance of a controversy between employer and workers in any field of industrial or other activity where there is by agreement or Federal law a means of settlement which has not been invoked.

And I do hereby urge upon all employers and employees within the United States the necessity of utilizing the means and methods thus provided for the adjustment of all industrial disputes, and request that during the pendency of mediation or arbitration through the said means and methods, there shall be no discontinuance of industrial operations which would result in curtailment of the production of war necessities.

In witness whereof, I have hereunto set my hand and caused the seal of the United States to be affixed.

Done in the District of Columbia, this eighth day of April, in the year of our Lord one thousand nine hundred and eighteen, and of the independence of the United States the one hundred and forty-second.

[SEAL.]

WOODROW WILSON.

By the President:

ROBERT LANSING,
Secretary of State.

FUNCTIONS, POWERS, AND DUTIES OF THE BOARD.

The functions and powers of the National War Labor Board are as follows:

To bring about a settlement, by mediation and conciliation, of every controversy arising between employers and workers in the field of production necessary for the effective conduct of the war.

To do the same thing in similar controversies in other fields of national activity, delays and obstructions in which may, in the opinion of the National Board, affect detrimentally such production.

To provide such machinery, by direct appointment or otherwise, for the selection of committees or boards to sit in various parts of the country where controversies arise, to secure settlement by local mediation and conciliation.

To summon the parties to the controversy for hearing and action by the National Board in case of failure to secure settlement by local mediation and conciliation.

If the sincere and determined effort of the National Board shall fail to bring about a voluntary settlement and the members of the board shall be unable unanimously to agree upon a decision, then and in that case and only as a last resort an umpire appointed in the manner provided in the next paragraph shall hear and finally decide the controversy under simple rules of procedure prescribed by the National Board.

The members of the National Board shall choose the umpire by unanimous vote. Failing such choice, the name of the umpire shall be drawn by lot from a list of ten suitable and disinterested persons to be nominated for the purpose by the President of the United States.

The National Board shall hold its regular meetings in the city of Washington, with power to meet at any other place convenient for the board and the occasion.

The National Board may alter its methods and practice in settlement of controversies hereunder from time to time as experience may suggest.

The National Board shall refuse to take cognizance of a controversy between employer and workers in any field of industrial or other activity where there is by agreement or Federal law a means of settlement which has not been invoked.

The place of each member of the National Board unavoidably detained from attending one or more of its sessions may be filled by a substitute to be named by such member as his regular substitute. The substitute shall have the same representative character as his principal.

The National Board shall have power to appoint a secretary and to create such other clerical organization under it as may be in its judgment necessary for the discharge of its duties.

The National Board may apply to the Secretary of Labor for authority to use the machinery of the department in its work of conciliation and mediation.

The action of the National Board may be invoked, in respect to controversies within its jurisdiction, by the Secretary of Labor or by either side in a controversy or its duly authorized representative. The board, after summary consideration, may refuse further hearing if the case is not of such character or importance as to justify it.

In the appointment of committees of its own members to act for the board in general or local matters, and in the creation of local committees, the employers and the workers shall be equally represented.

The representatives of the public in the board shall preside alternately at successive sessions of the board or as agreed upon.

The board in its mediating and conciliatory action, and the umpire in his consideration of a controversy, shall be governed by the following principles:

Principles and policies to govern relations between workers and employers in war industries for the duration of the war.

There should be no strikes or lockouts during the war.

Right to organize.—The right of workers to organize in trade-unions and to bargain collectively through chosen representatives is recognized and affirmed. This right shall not be denied, abridged, or interfered with by the employers in any manner whatsoever.

The right of employers to organize in associations or groups and to bargain collectively through chosen representatives is recognized and affirmed. This right shall not be denied, abridged, or interfered with by the workers in any manner whatsoever.

Employers should not discharge workers for membership in trade-unions, nor for legitimate trade-union activities.

The workers, in the exercise of their right to organize, should not use coercive measures of any kind to induce persons to join their organizations nor to induce employers to bargain or deal therewith.

Existing conditions.—In establishments where the union shop exists the same shall continue, and the union standards as to wages, hours of labor, and other conditions of employment shall be maintained.

In establishments where union and nonunion men and women now work together and the employer meets only with employees or representatives engaged in said establishments, the continuance of such conditions shall not be deemed a grievance. This declaration, however, is not intended in any manner to deny the right or discourage the practice of the formation of labor unions or the joining of the same by the workers in said establishments, as guaranteed in the preceding section, nor to prevent the War Labor Board from urging or any umpire from granting, under the machinery herein provided, improvement of their situation in the matter of wages, hours of labor, or other conditions as shall be found desirable from time to time.

Established safeguards and regulations for the protection of the health and safety of workers shall not be relaxed.

Women in industry.—If it shall become necessary to employ women on work ordinarily performed by men, they must be allowed equal pay for equal work and must not be allotted tasks disproportionate to their strength.

Hours of labor.—The basic eight-hour day is recognized as applying in all cases in which existing law requires it. In all other cases the question of hours of labor shall be settled with due regard to governmental necessities and the welfare, health, and proper comfort of the workers.

Maximum production.—The maximum production of all war industries should be maintained and methods of work and operation on the part of employers or workers which operate to delay or limit production, or which have a tendency to artificially increase the cost thereof, should be discouraged.

Mobilization of labor.—For the purpose of mobilizing the labor supply with a view to its rapid and effective distribution, a permanent list of the numbers of skilled and other workers available in different parts of the country shall be kept on file by the Department of Labor, the information to be constantly furnished—

1. By the trade-unions.
2. By State employment bureaus and Federal agencies of like character.
3. By the managers and operators of industrial establishments throughout the country.

These agencies shall be given opportunity to aid in the distribution of labor as necessity demands.

Custom of localities.—In fixing wages, hours, and conditions of labor, regard should always be had to the labor standards, wage scales, and other conditions prevailing in the localities affected.

The living wage.—1. The right of all workers, including common laborers, to a living wage is hereby declared.

2. In fixing wages, minimum rates of pay shall be established which will insure the subsistence of the worker and his family in health and reasonable comfort.

Method of presenting complaints and procedure of board.

Any person desiring to bring before the National War Labor Board an issue between employer and employees, of which the board has cognizance, shall deliver to the secretary of the board a written statement, signed by him, with his proper post-office address at his home and in Washington. The statement shall contain a brief description of the grievance and the names of the persons or corporations against whom he complains, with their post-office address.

Where an employer and employees both desire to submit a controversy to the board they shall sign a short joint statement of the issue between them, with their respective post-office addresses, and request the action of the board. They shall deliver this signed statement to the secretary of the board.

All documents in controversies in which the Secretary of Labor invokes the action of the board shall be delivered to the secretary of the board. Such complaints,

submissions, and references by the Secretary of Labor shall be received by the secretary of the board and filed in his office, and indorsed with the date of filing.

The secretary of the board shall keep one docket for the filing of all complaints, submissions, and references, and shall number them on the docket in the order in which they are received and filed. Thereafter the cases shall be referred to by such numbers.

Where the complaint or submission filed shall show clearly that another board than this has primary jurisdiction therein, the secretary is authorized to direct the proper reference, and to advise the party or parties initiating the proceeding of such reference. At the next session of the board the secretary shall advise the board of his disposition thereof.

The secretary of the board shall digest all cases presented and bring them to the prompt attention of the board for its action.

Organization of the board for hearings and adjustment.—In respect to every local controversy, two members of the board, one from the employers' side and one from the employees' side, shall be appointed to act for the board, the members to be named by the joint chairmen at the instance of the respective groups of the board. These members shall be called a section of the board, and shall hear and adjust cases assigned to them. If they can not effect any adjustment, they shall summarize and analyze the facts and present the same to the board with their recommendations.

The National Board may appoint permanent local committees in any city or district to act in cases therein arising. In the selection of such local committees, recommendations will be received by the National Board from associations of employers and from the central labor body of the city or district and other properly interested groups. Sections of the board are authorized to appoint temporary local committees where permanent local committees have not been appointed by the board.

Arbitration.—When the board, after due effort of its own, through sections, local committees, or otherwise, finds it impossible to settle a controversy, the board shall then sit as a board of arbitration, decide the controversy, and make an award, if it can reach a unanimous conclusion. If it can not do this, then it shall select an umpire, as provided, who shall sit with the board, review the issues, and render his award.

Coordination of the work of existing boards.—To comply with the direction of the President in his proclamation of April 8, 1918, constituting the National War Labor Board, this board will hear appeals in the following cases:

Where the principles established by the President in such proclamation have been violated.

Where an award made by a board has not been put into effect by employers, or where the employees have refused to accept or abide by such award.

To determine questions of jurisdiction as between Government boards.

Appeals will not be heard by the National War Labor Board from the decisions of regularly constituted boards of appeal, nor from any other board to revise findings of fact.

RESOLUTION ADOPTED BY NATIONAL WAR LABOR BOARD JULY 31, 1918.

Resolved, That the National War Labor Board deems it an appropriate time to invite the attention of employers and workers alike to the wisdom of composing their differences in accord with the principles governing the National War Labor Board, which were approved and promulgated by the President in his proclamation of April 8, 1918;

That this war is not only a war of arms, but also a war of workshops; a competition in the quantitative production and distribution of munitions and war supplies, a contest in industrial resourcefulness and energy;

to embrace a period of the war is not a normal period of industrial expansion from which time during the war should expect unusual profits or the employees abnormal wages; that it is in which industry is pursued only for common cause and common

have only such reasonable returns as will assure its use for the use, while the physical well-being of labor and its physical

[On August 8, 1917, at a comfort reasonable in view of the exigencies of the war should be considered in the light of these considerations]

That this board should be careful in its conclusions not to make orders in this interregnum, based on a view of progress in normal times, which, under war conditions, might seriously impair the present economic structure of our country;

That the declaration of our principles as to the living wage and an established minimum should be construed in the light of these considerations;

That for the present the board or its sections should consider and decide each case involving these principles on its particular facts and reserve any definite rule of decision until its judgments have been sufficiently numerous and their operation sufficiently clear to make generalization safe.

APPENDIX 2.

Upon his appointment Chairman Frankfurter issued the following statement indicating the general approach of the Policies Board toward its responsibility:

"Production is vital to the winning of the present battle and for the winning of the war—uninterrupted maximum production. Production means supplies for the fighting forces, and production is wholly dependent on labor. There must be an adequate labor supply wisely distributed to meet the needs of war industries. There must be sound and just conditions under which labor is employed.

"To secure the maximum uninterrupted production requires effective administration of industrial relations. The various labor agencies of the Government must therefore be focused to a single direction. Unification of effort and uniformity of conditions must be secured. The grave abuses of labor turnover, resulting in inefficiency and discontinuity of employment, must be stopped at once, and this can only be done by creating stabilizing conditions.

"Responsibility for securing these results has been vested by the President in Secretary Wilson as Labor Administrator. Secretary Wilson has asked me to assist him in carrying out this task. The assurance of heartiest cooperation has been given by three great production departments of the Government—the War Department, the Navy Department, and the Fleet Corporation. Steps will at once be taken by the Government as employer, through whatever department it may be operating, toward uniformity of treatment so as to secure stability of conditions and, therefore, the needed production. I shall have the benefit of the experience and support of the able industrial services of the different departments of the Government, as well as the help that will come through familiarity recently gained abroad with the way England and France deal with similar problems. All are agreed on the end to be attained—maximum production under the fairest conditions, which alone will assure the quickest winning of the war."

The necessity to accelerate the production of war materials, ships, munitions, and the endless list of goods needed for successful warfare was the occasion of the creation of the War Labor Policies Board. Its attention from the outset turned directly toward eliminating conditions which retard the productive energies of loyal American workmen. The board has endeavored in a broad way to establish policies favorable to the largest production. That clearly called for certain readjustments.

APPENDIX 3.

EMERGENCY CONSTRUCTION ADJUSTMENT COMMISSION

(Formerly known as Cantonment Adjustment Commission)

Complaints, in the order in correspondence relative to adjustment and control of wages, hours, and conditions in construction work carried on by the Government.

For the adjustment and control of wages, hours, and conditions in construction of cantonments, there shall be created a board of three persons, appointed by the Secretary of War, one to be nominated by the public, and one labor; the last to be nominated by Samuel Gompers of the Advisory Commission of the Council of National Defense and American Federation of Labor.

As basic standards with reference to each cantonment, such commission shall use the union scale of wages, hours, and conditions in force on June 1, 1917, in the locality where such cantonment is situated. Consideration shall be given to special circumstances, if any, arising after said date which may require particular advances in wages or changes in other standards. Adjustments of wages, hours, or conditions made by such boards are to be treated as binding by all parties.

NEWTON D. BAKER.

SAMUEL GOMPERS.

[In order to clarify the interpretation of this document, the following correspondence is attached to it:]

"JUNE 20, 1917.

"Mr. FRANK MORRISON,

"Secretary, American Federation of Labor,

"Washington, D. C.

"re: Cantonment construction labor conditions.

"MY DEAR MR. MORRISON: Confirming our talk over the telephone this afternoon, it must be clearly understood, as a basis for any labor adjustment machinery, that the Government can not commit itself in any way to the closed shop, and that the conditions in force on June 1, 1917, which are to serve as part of the basic standards do not include any provisions which have reference to the employment of nonunion labor. In our telephone talk just now, I understand that you accede to this view. The word "conditions" is of course clearly understood to refer only to the union arrangements in the event of overtime, holiday work, and matters of that kind. This was clearly understood between Mr. Gompers and myself this morning when we agreed that it would not be legally possible at this time to insert in an understanding even so much as a provision that preference be given to members of organized labor.

"Very truly yours,

"LOUIS B. WEHLE."

"NEW YORK, June 22, 1917.

"LOUIS B. WEHLE, Washington, D. C.

"Your understanding of the memorandum signed by Secretary Baker and me is right. It had reference to union hours and wages. The question of union shop was not included.

"SAMUEL GOMPERS."

[On July 27, 1917, the following supplementary agreement was signed:]

"The arrangement for the adjustment of wages, hours, and conditions of labor entered into between the signers of this memorandum on June 19, 1917, with reference to cantonment construction, may, on order of the Secretary of War, be extended

to embrace any other construction work which is now being, or may be from time to time during the war carried on by the War Department.

“NEWTON D. BAKER.

“SAMUEL GOMPERS.”

[On August 8, 1917, acting under this supplementary agreement, the construction of aviation fields was placed within the jurisdiction of the commission.]

[On September 4, 1917, the construction of warehouses and storage facilities was placed within the jurisdiction of the commission.]

Procedure under the memorandum of June 19, 1917, signed by Newton D. Baker and Samuel Gompers.

WAR DEPARTMENT, Washington.

1. The Cantonment Adjustment Commission will sit at Washington, D. C., unless specially ordered by the Secretary of War to go to the site of a construction.

2. It will obtain full information of union scales of wages, hours, and conditions in force on June 1, 1917, in the several localities where cantonments are to be constructed. For such labor as is being or will be employed for such work, the commission will rely upon data furnished so far as may be practicable by the Department of Labor.

3. The cantonments will be conveniently distributed and the Secretary of War will, for the period of the construction and with the unanimous approval of the commission, appoint for each district a responsible impartial examiner who shall act under the orders of the commission.

4. If a dispute arises which can not be adjusted satisfactorily by the contracting officer at the site and the employees involved, the contracting officer shall issue a provisional order which may be affirmed, reversed, or modified by the adjustment commission.

5. In cases where the provisional order of the contracting officer is not accepted, the actual work of construction shall not be interrupted, but the contracting officer shall notify the member of the commission representing the Army of the matter in dispute, the proposals made by each party for adjustment, and of the provisional order which he has issued. At the same time the member of the commission designated by Mr. Gompers shall obtain from a reliable source a report on the matter in dispute.

6. If the commission is notified that a dispute is not adjusted satisfactorily at the site, or if it learns from other sources that a dispute is in such condition, it will as speedily as possible send an examiner to the site.

7. The examiner shall have authority, acting under the orders of the commission, to mediate between the parties. If he fails in this he shall report promptly and fully to the commission with a recommendation. The examiner shall, if ordered by the commission or by any one of its members, remain at the site to supply any further information that may be asked.

8. The rulings of the commission are binding upon all parties concerned.

9. Notice of a ruling shall be sent to the contracting officer and to the spokesmen of the parties involved in the dispute.

10. The examiner will supervise the application of the commission's rulings with reference to hours, wages, and conditions and with reference to any accounting which may be proper under such ruling. Any change in wages, hours, or their application, when finally agreed to, or when finally fixed by the commission, shall for accounting

purposes be effective so far as practicable as of the date which may be fixed by the agreement, or by the ruling of the commission.

11. The commission shall have power to make additional regulations in order to achieve the purpose of the memorandum, and shall decide all questions arising under it.

WAR DEPARTMENT,
Washington, December 28, 1917.

It is hereby directed that all construction work undertaken by the War Department during the present emergency shall be carried out under the arrangement for the adjustment of wages, hours, and conditions of labor which was entered into between Mr. Samuel Gompers and myself on June 19, 1917, and which under a supplementary memorandum signed by the same parties on July 27, 1917, may be extended by me to embrace other construction work under the War Department.

BAKER, *Secretary of War.*

Copy to Samuel Gompers, Esq., President, American Federation of Labor, Washington, D. C.

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